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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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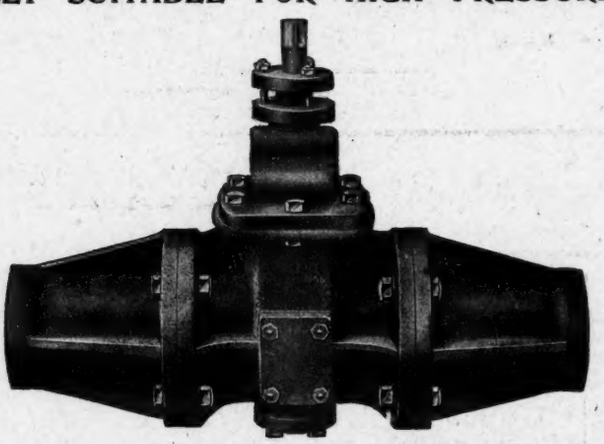

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

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EDITORIAL NOTES.

Economical Private Bill Legislation.

THE country seems to have time for almost anything now; and the reason probably is that the Government have been calling business men to assist in their deliberations. If one looks over the number of Committees that have been brought into existence with the view to making inquiries as to how things may be done better in the future than in the past, the survey gives some idea as to the proficiency of the country in wrong-doing before the war, as to what a large area exists for reformation, and as to what a wonderful and prosperous people we ought to be when practical shape is given to all the recommendations that have been, or will be, made, and work is vigorously proceeding under a corrected order of things. We shall be entitled to look for big results. The centre of much of the work of inquiring into misdeeds, and how to avoid them, is the Ministry of Reconstruction. The further they proceed in investigating into reorganization, the more intricate they find the ramifications of indifferent methods, and the need for remoulding. Widely separated, for instance, is the work of the Coal Conservation Sub-Committee who considered the lines on which the electricity supply industry should be remodelled—and who, by the way, made such a mess of their report that they have raised the ire of practically the whole of the men in the industry concerned—and that of the Sub-Committee on the Acquisition of Powers, who have been discussing and reporting upon the question of easing the procedure and the cost of obtaining new statutory powers [see *ante*, p. 438]. This is a matter of almost vital importance in the question of the coming reconstruction; for the war has stopped-dead the normal course of development. And not only will there be a lot of leeway to be made up after the war, but the war has brought into being and into the light so many new conditions and requirements that the statutorily controlled industries will, with the arrival of peace, have to be prompt, and perhaps frequent, visitors to Parliament. In these circumstances, and seeing that this piece of reconstruction is not one that calls for any capital expenditure, or materials or labour required in the war, Parliament might press forward without delay this question of simplifying the procedure and lightening the expense of securing additional powers through either Private Bills or Provisional Orders. The approach to Parliament ought to be made so inviting to industries that they will not for the future do as they have mostly done in the past—that is, defer as long as possible making parliamentary applications, on account of the trouble, the expense, and the uncertainties involved. The latter is not the way to facilitate national development; and so it is hoped that the work of the Sub-Committee of the Ministry of Reconstruction will do much to correct the wrong that now exists in this particular regard.

There is one matter which the Sub-Committee do not appear to have taken into consideration; and it is that the Houses of Parliament seem to encourage a sort of reverence for the ancient and the musty in legislation. It would certainly be a grand introduction towards reform in Private Bill procedure to clear out all those permanently concerned in it who are ardent lovers of precedent, those who are blind to the fact that what was good in times long past may not in these times be good for progress, and those who deliberately insert in Acts conditions which are destined, to the economic disadvantage of the country, to put a limit on progress and development. On the other hand, we are glad to see that the Sub-Committee find that General Acts want revising and bringing up to date. This would be a considerable means of economy in printing, paper, and other incidental parliamentary expenses. Our most "modern" Gas-Works Clauses Act has now the dust of nearly half-a-century upon it; and it makes a fine epitome of the then statutory condition of the industry. Many of the clauses are obsolete; and not a great number of them are now required. Outside it, there is a large bundle of clauses of common application that could be adopted by reference—if installed in a General Act. But before they are so installed, the gas industry would like to be heard regarding some of them, with a view to securing certain revision. If the Sub-Committee's recommendations are heeded, the "reconstruction" of General Acts bearing on Private Bill Legislation will be taken in hand—not only in connection with the gas industry, but in other directions.

The proposal that a Joint Committee of the two Houses should be set up with a view to producing a scheme to simplify procedure, and so to reduce expenses, should be acted upon immediately; for long-winded and costly proceedings in connection with some of the simplest of Bills have become a perfect scandal. We are not prepared to lay the whole blame for this upon Parliamentary Agents, counsel, and expert witnesses. They are not all of a like disposition. There are some Parliamentary Agents, counsel, and expert witnesses who regard their professional duties as being above the mere question of the number of days for which fees can be drawn in connection with any one Bill; there are others who measure their successes by the sum-total of their fees and out-of-pocket expenses. We are inclined to think that the costliness of proceedings is very much due to the unreasonable opposition of local authorities to private enterprise; and something might be done to cure vexatious opposition of this sort by more frequently compelling local authorities to pay not only the costs of their opposition, but the extra costs to which the promoters have been put by such opposition. More expedition, too, would be realized if there was some "reconstruction" of Select Committees. Men are appointed to serve on these Committees who are altogether strange to the subjects upon which they are called upon to adjudicate; and there is in consequence of this much waste of time. If there were Joint Standing Committees of both Houses, with upon them two or three men of professional training in the subjects with which Committees have to deal—whether railway, gas, water, electricity, tramway, or otherwise—this should lead to greater expedition and better judgments. This is a time of revolutions in notions and procedure; and to get away from some of our old systems should work miracles for the country. Among the suggestions made to the Sub-Committee have been the institution of Joint Committees of the two Houses, instead of traversing where there is continued opposition the same ground before separate Committees of the two Houses, and the precluding of promoters from proceeding by Private Bill if the powers could be secured by Provisional Order. The former proposal would cut two ways. It would, on the one hand, save time and expense; but, on the other, there are occasions when—of course, with perhaps a less competent tribunal than would exist under a new order of things—a second "court" has been an advantage. But given a proper single tribunal, there should be a balance of advantage in its favour. The Sub-Committee have also their eyes on the expenditure on Counsel and expert witnesses. The long retinue of Counsel and witnesses that some promoters and some opponents have is an abuse of a privilege. However, it is seen that there is plenty of scope for reform that will effect economy.

The same with Provisional Orders. The Sub-Committee, as already intimated, suggest that wherever powers can be obtained by Provisional Order as well as by Private Bills

the Order should be the favoured course. But then there have been some gross cases of waste of time and money in connection with Provisional Orders. Although the Sub-Committee point to the small percentage of Orders that have been opposed in Parliament on presentation for confirmation, the percentage includes cases in which the promoters have been pursued before the Board of Trade and through Parliament with relentless persistence by local authority opponents, who have wasted the ratepayers' money unnecessarily in order to gain something that their blind hostility to private enterprise, or ignorance, or obstinacy, or want of any sense of justice, has suggested. This has caused an expenditure on the part of promoters far in excess of what a Bill would have cost; and this ought not to be possible. It shows that the Provisional Order system is not without many organic weaknesses. The Sub-Committee make various proposals as to reform in this direction. They want to make the system even more attractive, and to confer larger powers upon the Board of Trade and the Local Government Board in connection with Orders—particularly those containing only powers that are established as parliamentary practice. We shall be glad to welcome real reform; but we hope that, before anything definite is done, the statutory industries will have an opportunity of saying something in regard to points mentioned in this article.

Looking Ahead from Present Conditions.

Changes are now made with kaleidoscopic rapidity; and we go to bed at night wondering what that is fresh the new morning will bring. A few weeks ago, a President in constructing a Presidential Address would have had much material upon which to discourse, but which through the inconstancy of conditions is to-day, so to speak, *sub judice*. There is the question of the quality of coal. The Coal Controller has (as announced last week) made a move in the matter—whether an effective one, time will show. The question of coke accumulations is, as also mentioned a week ago, receiving attention; and it is hoped the steps taken in this direction will release coal from household grates and industrial use to amplify the deliveries to gas-works. The Sulphate of Ammonia Association have been, or are, doing their best to convince the powers that be that the last fixed prices of the commodity for home consumption are unreasonably low, in view of the costs of material and of labour. Dehydrated tar was for a time held up for road purposes owing to the intervention of the Government; but there has been a loosening of the restrictions in this regard. The National Gas Council, too, are now endeavouring to settle the final details which will supply a new basis for dealings with the tar distillers. The financial hardships question has now been submitted to Parliament. The wages of gas-works labour is a matter that must be touched upon only in the most general manner. A President is therefore limited, if he just at this time chooses war time problems as the subjects for an address. This was evidently felt by Mr. W. B. Farquhar, of Ilford, in preparing the Presidential Address which he delivered to the Southern Association on Thursday last. Nevertheless, he lightly surveyed all the subjects alluded to, and so showed, by bringing them into well-defined focus, what a fearful combination of uncommon experiences are taxing the chief officials of every gas undertaking in these days. For their own personal comfort, there will be no class of men who will breathe more freely and with greater content than gas engineers when to near and far the message wings its way that peace has been declared. Therefore, those who heard Mr. Farquhar recounting from his own personal experiences the difficulties of the times did so with a great deal of sympathy, for his experiences are but a reflection of those of practically every man who was there to hear him.

Men who can stand up against an ordeal compounded of such complexity as has been the lot of gas engineers during the past well-nigh four years, and which ordeal has grown worse and worse, are men of the right stuff. It has called for the best that is in them; and the call has not been in vain. As the conditions have of late remorselessly stiffened, so with good resolution gas engineers, with prior experience and lessons at their backs, have met them; and the same men will meet after-war circumstances with equal strength of will, despite what is very obvious, that after the war there will be problems of an acute kind which are in the making and are being intensified by the conditions that now exist. Mr. Farquhar warns of this. It will then be no arm-chair state of ease that will reward gas engineers for what they have lately been passing through. They will find themselves engulfed in new problems of reconstruction (the President refers to them as revolutions in process and policy, which are part of the strengthening scheme) in which they will have to take a large part, many of them without the help of a full staff of skilled men. To be faced will be the developments which have grown out of the war, new plant and extensions, and the repair of the ravages caused by high-pressure work with the lack of sufficient materials and labour for proper repair and renewal, and both (to the extent that they can be obtained) at high cost. But in regard to our internal development, the President urges that whatever is presented that may help in the coming development of the industry shall not be dismissed, unless it is transparently unsound, until it is proved to be wanting in merit. In the most unexpected places, there is sometimes the germ of profitable development. But if ever there were conditions that are out of joint, those conditions are for the gas industry both current and prospective. People want cheap gas; but the cost of production has risen to an extraordinary pitch through the current expenses of materials and labour. In the great period of reconstruction, cheap gaseous fuel will also be a requirement.

But those who are not blind know all too well that after the war the prices of coal, oil, metal, and goods of all descriptions, as well as labour, will exceed the range of what were formerly normal prices. It is going to be a big tussle to make circumstances comply with the behests of requirements. Mr. Farquhar discusses this among his many other points. Capital is a great factor for or against a cheap supply of gas. In view of the certainty of adverse financial and other conditions, he asked if it is wise to postpone new extensions where these can be carried out—that is to say, essential extensions as opposed to (what he calls) "convenient" extensions, supplemented by extensions that will effect a saving in the handling of material and labour costs. Postponement, in his view, would be a fatal policy. But we are glad he accompanied his reference to extensions with the qualification "where these can be carried out." Many gas engineers have discovered in these times that it is all very well to propose, but there are higher powers that dispose. And a map of the country would be dotted pretty thickly if the places were all marked where there are to be found gas engineers who would be overjoyed to-day to learn that at last their priority certificates and permits had secured for their works the plant and the men necessary to bring into being long-deferred extensions. Even the power to issue redeemable stock for capital purposes (excellent as is the provision of such authority) may be rendered immediately futile by the combination, or any one part of the combination, of Treasury sanction and difficulties with both materials and labour. In the scramble for new works and repairs and renewals that will succeed the war, these difficulties will continue, though perhaps not with quite so much intensity as now. But there is wisdom being prepared with capital powers which will be valuable to tide-over the period of the high value of money and dear materials and labour; and those who are not so prepared may realize, too late for their purpose and convenience, that they have been imprudent. Mr. Farquhar thinks a general scheme ought to be brought into operation to enable all gas companies to take advantage of the issue of redeemable stock. We are afraid any movement in this direction—this being purely a financial question—would find Parliament more reluctant even than they have been when it has been suggested that they should permit the promotion of a Joint Bill for some necessary reform in the industry. Still the President's intentions are clear. In the first place, he suggests that the certain immediate after-the-war conditions as to capital, materials, and labour do not warrant the putting-off till to-morrow work that can be done to day; in the second place, he urges the need for suitable financial provision.

What Mr. Farquhar has to say regarding coal, oil, and the secondary products is all so much to the point, and so consistent with the general view, that it is unnecessary to make comment. A few words, however, in regard to two subjects. The first as to coke accumulations. The President hopes that some solution will be found of the problem as to how to relieve gas undertakings of their stocks, and prevent their recurrence during the time of stringency in respect of fuel transport. "It is," he remarks, "only a "sound proposition that this should be done by the Govern- "ment, as every ton of coke sold either for household or

"factory use is saving the transit of an equivalent amount "of coal on the railway." What is being proposed in the Coal Controller's office in this regard was outlined in the "JOURNAL" last week; but there was at the same time a suggestion that gas undertakings should also exhaust their own efforts to make the coke suitable, in the matters of size and moisture content, for the purposes for which there should be a large demand. There must not be complete reliance on external help to overcome the difficulty; as much as possible must be done at home. The other point we should here like to accentuate is the proved value of the Commercial Sections of the District Associations. This value has been enhanced with the increase in the weight of difficulty, which is a proof that both in foundation and objects the establishment of the sections as part of the machinery of the gas industry was good. Their usefulness will continue in the days of unknown trouble that are now ahead, and beyond which all in the industry are looking with confidence.

Coal Quality and Deliveries.

THE subject of "Coal in War Time" had an extraordinarily fine innings at the Southern Association meeting on Thursday. The discussion was opened by Mr. H. O. Carr, who has waged a very strong war against the increase of inert materials in coal, and has investigated it in divers ways so as to ascertain the disastrous effects that the licence in this regard has inflicted on the economic interests of the whole country in a variety of ways—tonnage, railway conveyance, labour, and losses of incomputable magnitude in every direction. The notes with which Mr. Carr opened the discussion will be found full of matter of this nature; and if a case were now needed to prove the utter folly of permitting this source of absolute waste to continue, in these notes the case is to be found. But the discussion itself was no less interesting—from Mr. G. M. Gill's experiments to prove the effect upon tonnage from the South Metropolitan Gas Company's coal deliveries to Mr. S. O. Stephenson's strong attack on the insensate condition that allows good gas coal to find its way into domestic grates, while much inferior coal goes into gas-retorts (which is another violation of economy), and onwards to Mr. Thomas Glover's interesting contribution, which inspires hope for improvement, and points the way to scientific gas making beginning with the practical cleansing and grading of the fundamental coal. In fine, the whole discussion presents instructive reading upon matters which are among those that are of supreme importance to the industry at the present time. Immediate interest lies in the fact that at length (as announced last week) Mr. Guy Calthrop and his Department are moving in the matter of endeavouring to right matters in regard to inert substances in coal deliveries. Although there is some consolation in this, there is not any compensation for the mischief that has been already wrought. We cannot replace the loss of the shiphold room, wagon capacity, labour, and of efficiency all over the country that has been rapidly accumulating while these excesses in useless material have had the sanction of omission to take rectifying action. But there will be some satisfaction in learning that, if the first effort to bring about reform is not successful, something else of a more effective character will be tried.

There is no denial on the part of Mr. Glover that the quantity of inert material and impurities in coal has largely increased, although he mentions the difficulty of obtaining (as he has been desirous of doing) authoritative data for specific coals, showing the actual percentage of ash and other useless matter before the war to bring into comparison with what exists now, and although he points out that coal from standard seams shows little difference. But there is really no need for specific comparative data of the kind. The loss of efficiency throughout the industries is as hard a fact as the extraordinary accretion of clinker and ash that has now to be dealt with from the furnaces. However, agitation, as Mr. A. E. Broadberry remarked, has had, and is having, effect, although the improvement appears to be of a somewhat sporadic kind, judging from the reports that come to hand from different quarters. But the fact that there is improvement in some directions gives conclusive support to the submission that the reasons advanced by Mr. Glover for the excess that has occurred are not all of an insurmountable character. One of them certainly is not. It is that in these times when there is not any considerable competition for orders for coal, but when there is great competition on the part of buyers to get coal, the colliery owners have been working thin seams which have been more or less neglected in the past, and which contain a higher proportion of impurity than the thicker seams. This is with a vengeance taking advantage of an opportunity, which is not, to say the least, patriotic, when, in the common interests of the whole country, its work in its entirety should be conducted as economically as possible, consistent with high efficiency. The colliery owners have, therefore, in this matter been acting with selfish motive rather than with the view to assist the country by supplying it with the best quality fuel available.

Another matter of some importance was treated of by Mr. Glover in his remarks. He invites the gas industry to consider whether it would not be to its real advantage to work from the present conditions with the view to permanent improvement in the quality of coal, by having it—especially the dusty variety—graded and automatically washed. Possibly one could pay too dearly for such improvement; but the question is one that, considering it from all sides, should not be too hastily rejected as incompatible with working economy. The gas engineer aims for improvement in his plant and processes, but hitherto has not sought, except in the most general way, an improvement of the coal that is the material with which he operates, and that is the base of his working. All coals would not require the treatment suggested. But suitably sized and washed coal would be an unquestionable benefit in carbonization; and proper cleansing of the coal would make the coke more acceptable than it is, and increase the purity of other secondary products. Much that is left in the coal, and that it would be as well to have removed to the extent practicable, inflicts upon the ancillary processes of gas-works additional duty and expense, the saving of which would help, as well as the increased value of the coke, towards paying for higher coal purity and suitability. The matter is worth the consideration of the technicians of the industry.

Linking-up the Gas and Pottery Industries.

TOWN gas has entered into most industrial spheres, and has made enormous progress on merit alone. But hitherto it has not effected any great advance in what should be (for it) an extensive field for lucrative service—the pottery and china ware industry. This industry appears to have been somewhat shy of gas, and gas of the industry. But when we look for a reason for this seeming mutual antipathy, the only one that can be found is that gas had not gas-fired appliances of a suitable order to offer, and therefore the pottery industry had no particular interest in departing from their old ways of operation. Why the gas industry had nothing developed for meeting the requirements of the pottery and china industry is probably because that industry has not the juxtaposition to the gas industry that other large industries have that already have recourse to gas-heated furnaces. The gas industry are large users of metal of all descriptions; it is therefore in immediate touch with the metal industries requiring gas-furnaces. Hence a reason for the quicker development in gas heating that has taken place in those industries. But ceramic manufactories should be a fertile field for gas undertakings in their neighburhood, given suitable furnaces. A suitable furnace has been the link required to connect-up the two industries; and from what we learn of the new "Porceflam" furnace (described in this issue), that link has now been forged—thanks to certain researches that Dr. J. W. Mellor and Mr. Bernard Moore have been and are making, under Government subsidy, in order to remove a certain deficiency of British pottery manufacturers as compared with their German competitors. In these researches, the investigators needed a better means of firing than had hitherto been available for certain essential operations. This need was eventually satisfied through the energy and time which the Brayshaw Furnaces and Tools, Ltd. (who are associated with Messrs. John Wright & Co.) put into the design and perfecting of a furnace that would meet the requirement. A proper kiln and suitable firing were the requisites; and the developed furnace has, we learn, been an unqualified success in connection with the special research work. It is equally suitable for ordinary working in producing the usual classes of pottery and the finest chinaware. It, of course, incorporates some special features to meet the special needs. There must be a gentle action in firing; and the distribution of heat in the furnace must be uniform. These essentials are realized. Town gas is used in the furnace at ordinary pressure, with air at very slight pressure.

To the description those interested will turn for further information. The gas industry wants the largest diversity of business it can get; and this furnace helps to pave the way to another considerable industry becoming more extensive customers than ever before.

"Financial Hardships" Bills.

It will be seen by our "Parliamentary Intelligence" that there are a number of Members of Parliament, prompted doubtless by the local authorities in the constituencies they represent, who possess the amiable desire that certain of the "Financial Hardships" Bills shall be read "a second time upon this day six months." Apparently they would like to see the capital of the gas industry perish; at any rate, their sympathy with the people who have provided the capital whereby gas, coke, essentials for the war (among them high explosives), and fertilizers for the land are provided, is an undiscoverable quantity.

Gas Industry and Battersea Polytechnic.

In this country, polytechnics are not looked upon with quite the same respect as they are upon the Continent. Here people have got into the habit of associating them with evening classes and the better technical education of men who take subordinate positions, and not suitable for the training of men who are to occupy professional offices. It is time false notions of the kind were given the happy dispatch. The Battersea Polytechnic is a good example. We know something of its fine equipment and the educational staff that matches it; and it can be said that, as a day college for the fundamental training of men for professional work, the Battersea Polytechnic stands second to none among the educational institutions of London. As will be seen by the proceedings at the meeting of the Southern Association last Thursday, the Battersea Polytechnic is specializing for the scientific training of young men who are destined for positions on the technical staffs of gas undertakings; and it is an aspiration of Dr. F. H. Newman and Mr. Wilson (the head of the Department of Applied Chemistry) that there shall be a strong bond of interest and a practical working alliance between the Polytechnic and gas undertakings—those immediately contiguous, and even lying far beyond the borders of the Metropolis. All railways lead to London; Battersea is very accessible; and the Polytechnic there a place that gives confidence as to the efficiency of its instructional methods.

Private Wagons and Transport.

It is well understood that the difficulties in connection with coal deliveries by rail are due not to the want of a sufficiency of coal, but to the shortage of rolling stock. Those gas undertakings and coal owners and factors who have provided themselves with wagons of their own have had the liberty which their wise provision gave them curtailed through the control with which the Board of Trade has been invested. They have not made any particular grievance of this, knowing that the national interests demanded that the best possible use should be made of the wagons, and that it was a waste to allow them to run empty. But now, so the "Iron and Coal Trades Review" understands, the Government are calling for 5 p.ct. of the private wagons of the country, which, taking the total now running on British railways at approximately 600,000, would yield about 30,000. Perhaps it would be rather less, as the proportion required being one in twenty, it is thought the smaller traders owning fewer than twenty will not be affected. If this be so, then gas undertakings with wagons of their own less than that number will congratulate themselves on the fact that their carrying capacity will not be diminished by the new demand. On the other hand, special efforts are being made, at the instance of the Government, to provide for the speeding-up of the repair of crippled wagons which are now out of action through the shortage of materials and men. However, regarding the question of terms for private wagons that may be commandeered, there is as yet no definite announcement; but it is said that the proposed basis is 6s. 6d. per week for 8-ton wagons, 7s. 3d. for 10-ton ones, and 8s. 3d. for 12-ton ones. It is stated by our contemporary that these rates, which include maintenance, compare by no means favourably with the figures which have been paid for the hire of wagons of late in the open market, where as much as 11s. to 12s., or even more, has been obtained.

Dr. Perkin and the "Coalite" Articles.

The Coalite people and their faithful supporter Mr. R. J Barrett, the Editor of the "Financier," will not approve of, and will not like, the crushing criticism that Dr. F. Mollwo Perkin has passed upon the articles that have been published in the "Financier," with the object of lauding the "Coalite" system. In a recent article on "Coalite Réchauffé" [*ante*, p. 344], we criticized the articles, and are pleased to receive from Dr. Perkin for publication in our "Correspondence" columns his well-merited rebuke to the "Financier" for publishing so much that is "inadequate," so much that is "random and inaccurate," so much that is constituted of "preposterous claims," and so much that is "absolute rubbish." Dr. Perkin has not only found suitable descriptive terms to apply to parts of the articles, but he shows ample justification for their use. The Editor of the "Financier" is not a recognized "expert" in the carbonization of coal, whether by high or low temperatures. Some of the statements he makes show this. They also indicate that he has been badly coached —for what purpose, and by whom? Echo answers "Coalite." The answer is explanatory of much. We may suggest that as the "Financier" appears to have plenty of space available for "Coalite" propaganda, it has room for Dr. Perkin's letter, if not for our recentarticle.

Sulphuric Acid and Fertilizers After the War.

For war purposes, the Ministry of Munitions have been compelled to largely increase the production of sulphuric acid by the erection of Government plants. This fact, as was noted some time ago, produced much misgiving in the minds of the established sulphuric acid makers as to what would happen to them if these plants continued to run after the war. It may be remembered that, in the House of Commons, Sir William Pearce stated that he estimated the producing capacity would be between 400,000 and 500,000 tons a year in excess of the demand. This would be a serious position for the makers, and, to an extent, for the users of sulphuric acid, as over-production costs money which someone has to pay. The Government realized that the position created would be an artificial one; but at the same time it is not to their interests to let their own good plants be sacrificed if they can be utilized for the benefit of the country following their dismissal from war service. A Departmental Committee was consequently appointed to consider the position, and to inquire into the prospects of utilization, and the best method of composing the difficulties of the situation. The Committee have now reported. Their estimate is that the plants in existence to-day can give 60 p.ct. increase upon pre-war production, rather less than half of which represents the productive capacity of plant owned or leased by the Ministry of Munitions. The Committee are obviously certain the country cannot possibly, within reasonable time, absorb the excess production.

Prospects of Absorption.

Little consideration shows this to be so. The dye industry will not make such progress that any material effect will be felt in increased consumption of acid. It is hoped, however, that the impetus given by war time conditions to the home consumption of sulphate of ammonia will continue to have after-war effect; but "the limiting factor is, under present circumstances, the amount of coal carbonized in connection with recovery plant [gas and coking]; and the acid consumption for sulphate manufacture bears a direct relation to this quantity, and not to the home consumption of sulphate of ammonia." We would go beyond this, and say that the real limiting factor is the demand for gas and metallurgical coke. We, therefore, suggest that the Government might, for more reasons than the absorption of sulphuric acid (which would be an incidental advantage), and with considerable benefit to the country, do something to encourage a greater demand for gas. However, the Committee look for an immediate increase in the demand for sulphuric acid by the development of the superphosphate industry, which in turn depends on the encouragement given to the agricultural industry; and, for the rest, they do not suggest the scrapping of the best of the Government plants, but the scrapping of any inefficient plants, with proper compensation. Among their other recommendations is one to which the gas industry can give hearty welcome. It suggests that arrangements should be made with shipping, railway, and canal companies for the cheap and adequate transport of raw materials

acid, and fertilizers, and that cheap freights should be arranged for the carriage of fertilizers to any part of the Empire or any allied or neutral country where an opening for a market may offer. Makers are keen-witted enough to know that Germany will be in strong competition in the years to come in the fertilizer markets abroad; and cheap transport for our home production will be a factor in meeting this competition, and so will cheap sulphuric acid.

PERSONAL.

In recognition of services rendered with conspicuous ability for over 22 years as Engineer and Secretary, the Directors of the Tonbridge Gas Company have elected Mr. J. DONALDSON to a seat on the Board as Managing-Director.

The Directors of the Harrow and Stanmore Gas Company have appointed Mr. CHARLES CHAMBERS Secretary (as well as Engineer). In the report submitted at last Tuesday's meeting, they stated that Mr. Chambers has for many years satisfactorily discharged the duties of Manager, and since the death of Mr. J. L. Chapman has been acting as Secretary.

Sympathy with the hearty wish that he may have a speedy and complete recovery, will be extended to Mr. NORTON H. HUMPHRYS, of Salisbury, who was knocked down by a motor-car on the 2nd inst., and removed to the infirmary in an unconscious state. After some days he was able to be taken home; and meanwhile application of the Rontgen rays has revealed a small crack in a minor bone of the right leg.

The Leeds City Council last Wednesday accepted a recommendation increasing the salary of Mr. W. B. LEECH (General Manager and Engineer of the Gas Department) from £1000 to £1100. Smaller increases were granted to Mr. C. H. MITCHELL (Commercial Assistant), Mr. R. N. WEBB (Manager of the New Wortley works), Mr. H. H. COLLETT (Manager of the Meadow Lane works), Mr. A. EDWARDS (Chief Chemist), and Mr. WALTER HOLE (Superintendent of Mains and Distribution).

Second-Lieut. J. G. BARRETT, of the 9th Battalion Loyal North Lancashire Regiment, has been awarded the Military Cross for conducting a very successful raid on one of the enemy outposts, and securing a prisoner. Lieutenant Barrett joined as a private in September, 1914, and went to the front in February, 1915. He afterwards rose to the rank of sergeant, and was recommended for a commission in January, 1917. He is Assistant Gas Engineer to the Clitheroe Corporation—the son of Mr. R. Barrett, the Gas Engineer.

The decision unanimously come to by the Tynemouth Gas Company, in the matter of a successor to the late Mr. William Hardie, will be a popular one. They have appointed as Engineer and Manager Mr. F. C. WILLIS, who entered the service of the Company ten years ago as Assistant Engineer. Mr. Willis (who received a lengthy technical education, extending over a period of ten years, at the Armstrong and Rutherford Colleges, Newcastle-on-Tyne) first entered the industry as a gas engineering apprentice under Mr. W. Doig Gibb, late Engineer-in-Chief to the Newcastle and Gateshead Gas Company, under whom a thorough practical experience was gained, both in the drawing office and upon the several works of the Company. During this period, a few of the most important extensions carried out by the Chief Engineer included the 5½ million c.ft. holder at St. Anthony's, the large distributing system between the Redheugh and St. Anthony's stations, water-gas plant at Redheugh, and many improvements and extensions at the Elswick station. Over the whole of the period of eleven years served under Mr. Gibb at Newcastle, Mr. Willis, first as pupil and then as Chief Assistant in the drawing office, had many opportunities of gaining thorough insight and experience in the mechanical and chemical sides of a gas undertaking. There was also much experience gained in the designing and engineering of important extensions in several gas-works in the North of England. During the ten years of service with the Tynemouth Gas Company as Assistant Engineer and Manager, under the late Mr. William Hardie, he has had full charge of the designing and erecting of many extensions carried out, including important additions to the carbonizing plant, high and low pressure distribution schemes, coke-handling plant, high-level railways, and several other extensions which have been entailed by the gradually increasing output of gas, which has risen from 456,848,800 c.ft. in 1907 to 556,852,800 c.ft. during 1917—or roughly 22 p.ct. Recent additions include benzol recovery plant and steam-raising plant. Of late years, one or two important extension schemes have also been engineered for certain Mid-Durham gas undertakings, one of which included the preparation of designs and specifications for a complete new 50 million c.ft. works.

Refractory Materials.—A copy has been received of a book (which will be reviewed in due course) entitled "Refractory Materials: Their Manufacture and Uses," by Mr. Alfred B. Searle, of Sheffield, who is the author of several other works on kindred subjects. The publishers are Messrs. Charles Griffin & Co., Ltd., of Exeter Street, W.C.; and the price is 18s. net.

OBITUARY.

The death occurred last week, in his 82nd year, of Mr. WILLIAM TEMPEST, the Chairman of the Dundalk Gas Company. Head of a large printing and publishing business, and associated with other public bodies, Mr. Tempest brought excellent knowledge and business ability to bear on his control of the gas concern; and his loss is widely regretted.

Lieutenant ALFRED FUDGE, Suffolk Regiment, attached to the Royal Flying Corps, died of wounds received while flying fourteen miles behind the German lines, on the 21st ult., at the age of 25. At the outbreak of war, he was a clerk in the Secretary's Office of the Wandsworth, Wimbledon, and Epsom District Gas Company, and, in September, 1914, joined as a private the 23rd London Territorial Regiment. He was in action at Givenchy in May, 1915, when he was severely wounded. After being discharged from hospital with an arm permanently injured, he obtained a Commission, and was gazetted as Second Lieutenant to the 10th Suffolk Regiment, and in one of the Somme battles was again wounded at Ginchy, in September, 1916. In 1917, he was transferred to the R.F.C. as Lieutenant; and it was while serving as an observer that he was mortally wounded by German machine-gun fire. Although he was brought back to the casualty clearing station, he succumbed a few hours later. The Secretary of the Company, Mr. C. W. Braine, informs us that Lieutenant Fudge was a young man of sterling character and marked ability; and he will be missed by many in the Company, by whom he was well liked. He was an Associate of the Chartered Institute of Secretaries, having qualified for this a few months before the war—a circumstance which the Directors of the Company were pleased to acknowledge in a suitable manner.

The Treasures of Coal Tar.

Believing with good reason that, in order that the effort now being made to promote the more widespread application of science, and more especially to render this country independent of others for the supply of the dyes necessary for the maintenance of our textile industry, shall not be relaxed, it is essential that the people as a whole should interest themselves in the work, and should gain some knowledge of what has been achieved in the past, as well as an understanding of the nature and complexity of the problems to be solved, Dr. Alexander Findlay, M.A., F.I.C., has compiled a readable little book on the "Treasures of Coal Tar." The author is Professor of Chemistry in the University of Wales; and he writes in such a manner as to bring a highly technical subject fairly within the grasp of the general reader. In his preface, he points out a fact which it is well should be remembered—that, as coal tar is produced, not as a primary, but as a bye-product in the manufacture of illuminating gas and of metallurgical coke, its production is dependent on the demand for coal gas and coke; and the outlet for the latter depends on the development of our metallurgical industries. A proper balance between the output of, and the profitable outlet for, the different products and bye-products of the distillation of coal must, it is argued, be established; and the whole series of interdependent and interlocking chemical industries must be carefully organized and developed, so as to ensure the greatest efficiency and the best utilization of all the products. In successive chapters, the production, distillation and constituents of coal tar, and molecular architecture are fully dealt with; and then there is set forth the wonderful story of the many dyes which have, "by reason of their almost infinite variety and applicability, their range of colour and delicacy of tone, ousted the natural dyes to a very large extent from the dye-works." Drugs, perfumes, photographic developers, and explosives are similarly treated in the concluding portions of the book. It may be noted that the value in round figures of the estimated world's production of coal-tar dyes in 1912 is given as £19,730,000; while of all the dyes used in this country in the textile, fur, feather, paint, and other industries, somewhere about 10 p.ct. were of home manufacture. The book is published by Messrs. George Allen and Unwin, Ltd., No. 40, Museum Street, W.C. 1, at the price of 4s. 6d. net.

A joint visit by members of the Eastern and Western Districts of the Scottish Junior Gas Association will be made next Saturday to the Alloa Gas and Electricity Works. After the inspection, a buffet tea will be served in the national kitchen at the gas-works, the apparatus in which was supplied and fixed by the Gas Department.

The Governing Body have decided to alter the name of the Manchester School of Technology so that for the future it may be known as "College," instead of "School." It is felt that the latter term leads to misconception on the part of many people; and the change of name has been rendered the more necessary by the development of the School of Technology during recent years. In 1911-12, the College was first recognized by the Board of Education as being of university rank, and was placed under its own name in the list of British universities and university colleges receiving grants from the Government. Great indeed has been the growth of the School of Technology, founded in 1824 as the Manchester Mechanics' Institution, and now a College of university rank, attracting students from all parts of the world.

ELECTRICITY SUPPLY MEMORANDA.

SOMEHOW or other one cannot get away from the great political question of the electricity industry—its reorganization. Every week from some fresh quarter comes indication of further irritation over the Coal Conservation Sub-Committee's report on the future of electricity generation and supply. Mr. F. W. Purse, the Electrical Engineer of Carlisle, is the latest complainer as to what he calls the "one-sided statements" in the report. If we read the critics correctly, the report must be spotted all over with blemishes, with craftiness as the leaven used in its production. Mr. Purse deals largely with the financial side of the report; and he is incensed as to the comparisons made between company and municipal undertakings. Upon which latter point municipalities owning electricity undertakings always think they are hardly dealt with by legislation, and companies supplying electricity consider they are worse off. We incline to agree with the latter. They have not only the statutory commandments to obey, but they have the constantly overhanging knowledge that the municipal watchdogs are ever-ready to spring at them on the slightest provocation.

More Criticism.

Incredulity, Omissions, and Camouflage.

There is the smile of the incredulous on the face of Mr. Purse over the remark of the Sub-Committee that the adoption of their scheme of super-generating stations would show a "total possible national advantage of £100,000,000 per annum." Not a single word as to the net financial result. Silence as to the cost of establishing super-stations and trunk roads to obtain the national advantage referred to. Not a single figure as to the capital cost that would be involved, or the ultimate price at which one might expect to purchase the power. The financial portion is not the only one on which the report is silent. Mr. Purse cannot trace in it where the suitable sites for the super-stations are to be found that embrace the three essentials of (1) an ample supply of water; (2) close proximity to coal-fields to effect a saving in transport; and (3) reasonable distance from the districts to be supplied. Like other critics, he pours ridicule upon the attempt to use the North-East Coast companies as a comparison with the Lancashire area, and to take average prices. "I venture to think," says Mr. Purse, "that if the prices charged to individual consumers on the North-East Coast be compared with those of municipalities, where the consumers take equal quantities of power under similar conditions, there will not be found to be that large difference which the report suggests, particularly bearing in mind that the municipalities pay a fixed interest on their capital, and also make definite repayments of capital each year." This may be perfectly true; but at the same time there is a good deal about municipal policy in respect of management that we cannot endorse, nor can a considerable number of municipal gas and electricity officials and committees. Although he has read the report more than once, Mr. Purse has failed to find any definite proof that the change to super-stations would be a sound one not only nationally, but financially. He regards the "coal conservation" aspect as pure camouflage for the creation of a huge private monopoly; and naturally, in his opinion, if the municipalities are given the same power as it is suggested should be conferred upon the new electric supply authority, there is no doubt the same saving in coal would be realized at a far less capital outlay. That is a mere expression of opinion; and it would be interesting to know why.

An Indictment of the North-East Combination.

Either from intense patriotic motives or intense irritation, Mr. Andrew Gemmell has severely criticized the references in the report of the Sub-Committee on Coal Conservation to the North-East Coast Companies; and his criticism should be answered, as at any rate there is clear evidence in it that Mr. Gemmell (who was formerly officially associated with these Companies) is satisfied in his mind that all he says is legitimate and true. The criticism is presented in a pamphlet; and the object is to show that the North-East Coast Companies cannot be taken as a pattern of unblemished character. The report of the Sub-Committee gives the average selling price of ¼d. per unit for the North East Coast Companies. Mr. Gemmell states that this "average" price is of little value without stating the Companies to which it refers, because one company or group of the existing combination can be made to have the appearance of success with disastrous results to another section of the combination; and he alleges that it has been the practice of the North of England Companies not to give all the statutory statistics which would have shown annually the average selling price. From a commercial point of view, he holds that the combination, instead of being held up as a model to be copied, ought to be regarded as an example to be avoided. The combination has employed methods by which not the lowest possible prices have been assured to the users of electric power, but extravagant rewards have been ensured or guaranteed by the use made of "middleman" Companies like the Waste Heat Company, interposed by the Cleveland Holding Company—itself an intervening Company between the consumers and the authorized undertakers appointed by Parliament. Mr. Gemmell thinks that it would be difficult to imagine an organization more dangerous to industrial progress; and he states that the business structure has involved a capital expenditure somewhere about 5 millions sterling. We cannot follow the indictment point by point; but a sample statement in the author's own words is the following:

> The Cleveland Holding Company, by hiring the Parliamentary Company's coal-fired generating stations, and by hiring the Waste Heat Company's generating stations, controls the whole electrical requirements of the Parliamentary Company. But not only does the Cleveland Holding Company supply all electric current at its own price to the Parliamentary Company, it has also supplied large quantities of coal-fired station or other plant at its own price to the Parliamentary Company at huge profits, the extent of which and their disposal should have been fully revealed to the shareholders by the Cleveland Directors. Thus, the acrobatic feat of the business—having been made, in effect, to sell to itself its own plant at an immense profit—has been performed to the satisfaction of its Directors, who have stoutly declared that "everything is strictly in order" when called in question. The opera-bouffe character of these performances is further illustrated by the business having been made to lease to itself at a high rental the plant it has already sold to itself at a great profit, and by the additional operation of making the business sell to itself the electricity it produces from its own coal-fired generating plant, as well as from the waste-heat plant, before it sells to the consumers.

There is matter here and in other parts of the pamphlet which should be controverted, if it can be, by the Directors of the North-East combination, if only to dispose of the sneer which one finds in such passages as this: "The public advantage of the 'initiative and resource' of private enterprise displayed in the North of England which have so impressed the experts of Lord Haldane's Committee is not apparent to the lay mind." It is clear that, if every report by specially appointed Committees is subject to so much criticism as has been this one of the Sub-Committee on Coal Conservation, the Government will have great difficulty in knowing where to place their trust, and whose counsel they should follow. However, there is one thing they ought to carefully avoid in future. This is not to appoint men with settled preconceived notions on the subject upon which they have to adjudicate, or at any rate ensure that they have a proper balance of opinion on the Committee, so as to ensure that the reports are not so destitute of impartiality as so patently is this one.

Prof. Watkinson and Efficiencies.

It was a highly interesting paper that Prof. W. H. Watkinson read before the Liverpool Engineering Society [see *ante*, p. 459] upon "Our Fuel Resources and Possible Improvements in their Utilization." It would be a big task to comment on all that the contribution contained; but here we may make a few observations on points that come within the scope of the "Memoranda." In some respects, when treating of efficiencies, Prof. Watkinson rather under than over estimates them, and, in consequence, does some injustice. For example, in treating of the efficiency of the carbonization process of gas-works, he only credits it with a heat efficiency of 55 p.ct. If he takes the thermal value of the gas, coke, and tar produced for sale (without giving credit for the utilitarian value of the other products), he will see that 55 p.ct. is not a fair computation. He accords the coal fire an efficiency of 25 p.ct. The efficiency of a coal fire is a variable quantity; and its average may be taken to be somewhere about 20 p.ct. The efficiency of the latest type of gas-fires he places at about 50 p.ct. If he measures the heat of the waste gases passing up the flue, he will find there is somewhere about (at all events, with modern types of gas-fires) 70 to 75 p.ct. of heat to be otherwise accounted for. Accepting the tests made at the Leeds University and elsewhere, he will also find that the modern gas-fire can constantly give nearly 50 p.ct. of radiant heat, and the balance between this and the heat passing up the chimney (which promotes ventilation) may be taken to be heat usefully employed in supplementing the radiant heat in warming a room. The suggestion that the electric radiator has an efficiency in the neighbourhood of 100 p.ct. is an arbitrary statement which we should much like Prof. Watkinson to prove. Of course, he admits, and shows, that the 100 p.ct. represents a very small proportion of the heat of the coal originally used under the boiler at the generating station. In connection with this point, it is so often overlooked that the gas made per ton of coal only constitutes part expenditure of the ton, and that there are the coke and tar remaining, and the value of all the other secondary products to be taken into account. But as to the reputed 100 p.ct. efficiency of electric radiators, something is expended in the conversion of the electrical energy into heat; and how much of this heat is radiant and how much convected? Take different electric radiators now on the market; and it is found that their useful efficiency in warming rooms varies immensely, though the current consumed may be the same.

Fires and Ventilation.

Prof. Watkinson also comments on the ventilating effects of coal, gas, and electric heaters. The coal fire, he says, is an excellent ventilator, the gas-fire is not nearly so good as the coal fire, the electric radiator does not generally give any good ventilating effect. It would be disastrous to such heating power as the last-named is able to exercise, if it attempted the dual work of heating and ventilating agent. Now what does Prof. Watkinson mean by the gas-fire not being such a good ventilator as the coal fire? The ventilating effect of the latter varies with the condition of the fire itself, and the amount of heat passing away with the foul gases, whereas the ventilating effect of any given gas-fire is constant under any settled conditions of use. The difference between the greater average ventilating effect of the coal fire and the gas-fire may be unnecessary and so wasteful. There is a condition that is hygienically

sufficient, and one that may be greatly in excess. In a paper read before the Society of Arts in February, 1912, Drs. Leonard Hill and Martin Flack stated that the gas-fire is the equivalent of the coal fire in promoting ventilation. In the well-known Glasgow experiments, it was shown that, in the room in which the experiments were made, and under the conditions then prevailing, the average flow of chimney gases with coal fires was equivalent to changing the air of the room some ten times an hour. The ventilating efficiency of the gas-fires, as shown by the waste gases passing up the flue per hour, was equivalent—the gas-fires being of different types—to an average change in the air of the room of 5·2 times per hour, with a minimum of 3·7 with one type of fire. From the hygienic point of view, there is nothing in this condition which shows that hygienically a gas-fire as a ventilating medium is not as good as a coal fire. But Prof. Watkinson suggests that the ventilation of a house should be effected independently of the heating arrangements, "because unless this is done there will be little or no ventilation when the fires are off during the summer months." In these matters our ideals may be excellent, but we have to be practical, and consider conditions. The fact is that in the great majority of houses there are no independent ventilating arrangements. In the summer months, people are in the habit of throwing open the windows; in the winter they frequently sit with them closed. But the gas-fire or the coal fire provides them with automatic ventilation, though the people who abhor a little fresh air in the winter may not be aware of the fact.

Cooker Deficiencies.

In the paper there is a little criticism of the gas-cooker—only in one respect—and a carefully guarded reference to electric-cookers. The gas-cooker, we learn, sends its products of combustion into the room in which it is used; but Prof. Watkinson admits this is not an insuperable drawback. A hood over the cooker and a flue will put the drawback completely out of court. But as to the electric-cooker. It is "said" to effect roasting and other processes better than the gas-oven. Prof. Watkinson well knows the difference between assertion and actual capability. Working at equal temperatures, and given the same time in the cooking of joints of equal characteristics, why should one heating process save while the other one unduly wastes? Again, with the electric-oven, the cook has to become the slave of fixed heats. It is further calculated by people who really ought to know that at least 75 p.ct. of culinary operations have to be done on the hot-plate, which is the most inefficient part of the electric-cooker. With large ranges with level tops, chefs of considerable experience do not like the concentrated heat of the electric heating elements. They prefer the gas-range which gives them high heats (if required) over the flames, while the flow of waste gases supplies them with modified heat over the rest of the working plane, which can be used for slow boiling, simmering, or keeping cooked food warm. There is more in the detail of comparison of the two systems than there is in the glib, narrow declarations of electrical people who are all too glad to secure even modest progress for the electric-cooker, and, in doing so, have no compunction over the non-disclosure of shortcomings, being quite content to let the user find them out for himself, and to make the best he can of the situation when experience has taught him more than the electrical advocate has chosen to tell him.

SULPHURIC ACID AND FERTILIZERS.

Departmental Report on the Post-War Position of the Trades.

SOMEWHAT more than a year ago, a Committee of thirteen members—Mr. Edward Shortt, K.C., M.P., being Chairman—was appointed by the Minister of Munitions to consider and report on the position of the sulphuric acid and fertilizer trades, as affected by the new acid plants which have been erected for the Government during the war by the Ministry of Munitions The Committee, which was a strong one—including Mr. D. Milne Watson (as Chairman of the Sulphate of Ammonia Association), Mr. W. S. Curphey (Chief Inspector under the Alkali Act), Sir William Pearce, M.P. (Messrs. Spencer Chapman and Messel, Ltd.), and Mr. R. G. Perry (Messrs. Chance and Hunt, Ltd.)—have now issued their report, and (with certain omissions and modifications necessary in the national interest) it has been published.

In order to arrive at anything like a reliable estimate of the post-war condition of affairs, it was found necessary to inquire carefully into the pre-war and present positions. The national productive capacity before the war was, the Committee say, certainly considerably larger than the actual output; and the acid manufacturers were able to increase the production of sulphuric acid by at least 10 p.ct. without additions to the existing plant, when greater production was required. Before the war, acid was consumed principally in the production of superphosphates and sulphate of ammonia (each of which consumed about 30 p.ct.). The enormous demand during the war for sulphuric acid of high strength for explosives manufacture, has led to very far-reaching changes in the sulphuric acid industry; and as the result of the erection of large oleum plants in connection with the Government explosives factories, and the extension of existing plants by private manufacturers, the productive capacity of the country has reached a figure far in excess of the pre-war consumption, and has created a post-war problem of considerable difficulty. Allowing for a post-war reversion to normal working conditions, the Committee anticipate that the output, in terms of chamber acid, will be 60 p.ct. in excess of the pre-war production.

As has been remarked, the production of sulphate of ammonia and of phosphatic manures before the war provided the principal outlets for sulphuric acid; these two industries absorbing about 60 p.ct. of the then production. The progressive introduction of bye-product coking had been steadily increasing the output of ammonia, which at the outbreak of war amounted to 400,000 tons per annum, expressed as sulphate. About 15 p.ct. of this production was not put on the market in the form of sulphate, but was converted into other ammonia products. The home consumption of sulphate of ammonia for agricultural purposes was only 60,000 tons per annum; and the remainder was mainly exported. As to superphosphates, the available plant was capable at that time, if continuously worked, of producing considerably more than the actual requirements. One advantage which the fertilizer trades enjoyed was the existence of active and energetic trade associations. Both the Sulphate of Ammonia Association and the Fertilizer Manufacturers' Association were able to render some valuable assistance to the individual producers, especially by organized propaganda, with a view to the creation and expansion of markets for their products. The expansion in the production of ammonia has during the war period been somewhat accelerated owing to its association with the bye-product coking industry. The production of sulphate of ammonia has, however, suffered some temporary decline, owing to the diversion of large quantities of ammonia to the production of nitrate of ammonia. In view of the requirements of sulphuric acid for explosives manufacture, plants have been erected on a considerable scale for the conversion of crude ammonia into concentrated ammoniacal liquor. A substantial proportion of the requirements of ammonia for munitions purposes has in this way been purchased in a form which requires no sulphuric acid for its manufacture. The total production of sulphate has thus been temporarily reduced from 350,000 tons to a little over 250,000 tons. At the same time, there has been a large increase in the home consumption for the land; and the Board of Agriculture are understood to be aiming at the application of the entire available supply of sulphate to home purposes—the export trade having accordingly nearly disappeared. The production of superphosphate has been materially reduced during the war, owing to the lack of sulphuric acid.

The principal raw materials in use before the war for sulphuric acid manufacture were Spanish and Norwegian pyrites and spent oxide. But arrangements have since been made to introduce a new sulphur material in the Australian zinc concentrates. With regard to the probable post-war consumption of sulphuric acid, the Committee remark that against the surplus is to be set the probable increased consumption for various purposes; and they have come to the conclusion that by far the most important prospect of utilizing the increased quantities of acid is to manufacture artificial fertilizers. It is probable that the impetus which has been given to the home consumption of sulphate of ammonia will continue to be felt; but this will to a large extent be provided by a reduction of exports. The limiting factor is in present circumstances the amount of coal carbonized in connection with recovery plant; and the sulphuric acid consumption for sulphate manufacture bears a direct relation to this quantity, and not to the home consumption. During the war, though every effort has been made to extend bye-product coking plants, the increased production of ammonia has only been approximately 7 p.ct. The coke-oven industry may be expected to absorb rather larger quantities of acid during the years following the war; but the increase can hardly be considered of much importance to the acid situation. The cyanamide process and the Haber process of manufacturing ammonia from atmospheric nitrogen, which have now been enormously extended in Germany, may ultimately assume similar importance in this country; but as their success is conditional upon the provision of cheap power, and as the processes are as yet undeveloped here, they cannot be so important a factor as to influence to any marked extent the conditions immediately following upon the cessation of hostilities. On the other hand, the introduction of synthetic methods for the production of nitric acid, which are now in early stages of operation, tends to diminish the consumption of sulphuric acid for the manufacture of nitric acid. The Committee are therefore agreed that the immediate increase in the consumption of acid after the war is almost wholly a question of developing the superphosphate industry.

In view of the proved agricultural need for the use of additional quantities of fertilizers, the Committee are of opinion that the large surplus of sulphuric acid plant which will become available at the end of the war provides an opportunity of an altogether exceptional nature for the development of a vigorous agricultural policy in relation to the efficient cultivation of the soil; and they recommend that the powers under the Corn Production Act should be widely employed to enforce the adequate use of fertilizers. At the same time, any necessary measures should be taken to secure the sale of fertilizers to the farmer at reasonably low prices. In every way, farmers should be encouraged and educated in the increased use of fertilizers. As there will, even then, still remain a large surplus of the possible output of sulphuric acid to be dealt with, the Committee consider it advisable that all possible steps should be taken to bring the acid trade as a whole into consultation. All reasonable encouragement should therefore be given to the formation of a National Association of Sulphuric Acid Manufacturers.

The Committee are of opinion that any proposal for a *pro rata*

reduction of output is fundamentally wrong. The elimination of the less economical units should be the aim of any scheme for the reduction of the net surplus; and the Government, as well as private manufacturers, must be prepared to shut-down plants of proved inefficiency. Compensation out of public funds should be made to makers whose plants are thus cut out. The national consumption of acid before the war was increasing by from 2 to 3 p.ct. per annum; and it will therefore be wise to leave in existence more producing capacity than will actually be required immediately after the war. The Committee devoted much time to considering the effect of the importation of Australian zinc concentrates, and the treatment of these and native and Burmese ores. They recommend the formation of a Joint Committee of the different Associations, &c., interested (1) to endeavour to secure the introduction of acid made in Government works to the market in such a manner as to produce a minimum of disturbance, having due regard to the interests of all the industries concerned; and (2) to suggest means whereby the erection of new acid works to deal with the gases from zinc concentrates can be avoided. They also think arrangements should be made with the companies concerned for cheap and adequate transport of raw materials, acid, and fertilizers.

From evidence and discussion on the question of costs, the Committee think certain conclusions can be drawn—among others that the cost of producing high strength or low strength acids by means of the Mannheim contact plant, whatever type of sulphur material is used, is substantially higher than in the cases of the Grillo or Tentelew systems; and that for low strength acids the Mannheim plant could not compete with the ordinary chamber plant. In the manufacture of artificial fertilizers, the charge for acid is a relatively large proportion of the total cost of production; and in the case of superphosphates, where competition is keen, the cost of the acid is a factor of extreme importance. Thus while efficient working and low cost of production are essential throughout the industry, they become a manufacturing problem of even greater importance when associated with the production of superphosphate.

There are appended to the report various recommendations for the relief of acid and fertilizer makers from the competitive effect of surplus acid—that the rate of depreciation on acid plants for income-tax purposes should be increased to at least 10 p.ct., and that the increase should be retrospective; that a scheme for the scrapping of plant be drawn up by a Government Committee; and that financial provision be made in respect of plants temporarily shut-down. The necessity of improving the status of the technical chemist is emphasized; and means are indicated for encouraging a more systematic study of manufacturing costs.

COMPULSORY ACQUISITION OF LAND BY PUBLIC UTILITY UNDERTAKINGS.

In last week's issue [p. 438], there appeared a paragraph referring to the question of the compulsory acquisition of land by, among others, public utility companies. Some further information is now available through the issue by Dr. Addison, Minister of Reconstruction, of the first report of the Committee appointed under the Chairmanship of Mr. Leslie Scott, K.C., M.P., to consider the defects in the existing system (1) of acquiring, and (2) of valuing land for public purposes, and to recommend any changes that may be desirable in the public interest. The present report only deals with the first part of the reference.

The whole inquiry has an important bearing on post-war problems of reconstruction, the essence of which lies in increasing national production to make good the wastage of war. To achieve this end, the importance of a right handling of the question of land cannot be over-stated; such acquisition being of most vital necessity to almost every productive enterprise. It is owing to the special position of land as a "necessary commodity of limited extent" that the British law recognizes a special limitation of the rights of private ownership in land by authorizing compulsory expropriation when public interest demands it, subject to just compensation. Private promoters of commercial enterprise, no matter how desirable their schemes may be in the national interest, are unfortunately situated in respect of this matter. The expenditure upon counsel, agents, and witnesses (who may have to appear again and again in the course of applications under the present Private Bill or Provisional Order procedure) renders compulsory acquisition of land virtually prohibitive for private promoters, save large corporations and the wealthiest companies.

The Committee's unanimous conclusion is that some simpler, more uniform, and less costly procedure for compulsory acquisition of land has now become essential. Their solution of the problem is directed to mending, rather than ending, the existing jurisdiction of the Parliamentary Committees for the investigation of schemes involving compulsory powers. The drawbacks to these tribunals are that their procedure is slow and costly, and that its extension to all proposals for the compulsory acquisition of land in future would make impossible demands on the time of Members of Parliament. On the other hand, the investigations of such schemes by Parliamentary Committees in the past have been marked (as the report emphasizes) by a very high standard of justice and common sense; and their decisions, as being those of Parliament itself, have an element of authority and elasticity not attainable by any purely extra-Parliamentary Tribunal.

The Land Acquisition Committee accordingly propose that a general sanctioning authority for the grant of compulsory powers in regard to land shall be set up in the form of a panel of Commissioners—including Members of Parliament and others of similar standing with general experience of affairs. Government officials or professional experts, as such, will not be included in the panel, but will have their proper opportunity of appearing as witnesses before the tribunal. Any scheme involving the compulsory acquisition of land will be publicly (and, so far as possible, locally) investigated by Commissioners chosen from this panel; and the decision of the Commissioners will be final on all questions of fact or the intrinsic merits of any scheme. Full parliamentary control over matters of policy will be retained by providing for direct reference to Parliament upon any unsettled questions of principle; and members of the panel (Parliamentary and non-Parliamentary) will be periodically appointed by a Parliamentary Selection Committee drawn from both Houses.

The sanctioning authority will thus become to all intents and purposes a Sub-Committee of Parliament, with co-opted members from the large body of public-spirited men of all classes outside Parliament whose general experience fits them to act as Commissioners for such a purpose. Delays will be reduced by permitting schemes to be submitted to the sanctioning authority at any time of the year (instead of only during two months, as at present); and a final decision on any scheme should normally be reached in a few weeks. Provision is made for reducing expenses by giving the Commissioners themselves a wide discretion over procedure and costs, with a direction to exercise their discretion in each case with a view to curtailing unnecessary evidence and discouraging unreasonable contention on either side.

Production of Calcium Carbide.

The essential requirements for the production of calcium carbide at a low figure are, says the "Engineer," an abundance of cheap raw material and cheap power. In Japan conditions are particularly favourable in these respects. The cost of production prior to the war was from 3 yen to 3·50 yen per 100 lbs. [yen = 2s. 0½d. at par]; but it has gradually increased during the past three years in consequence of the advanced cost of raw material and labour. At present the average cost of production may be estimated at, approximately, 5 yen per 100 lbs. Owing to the enormous demand in Japan for sulphate of ammonia, and the consequent rise in price, one Japanese carbide factory, with a capacity of from 25,000 to 30,000 tons per annum, is now concentrating its efforts on the production of sulphate of ammonia—the ammonia being made from calcium cyanamide produced from the carbide by the fixation of nitrogen drawn from the air.

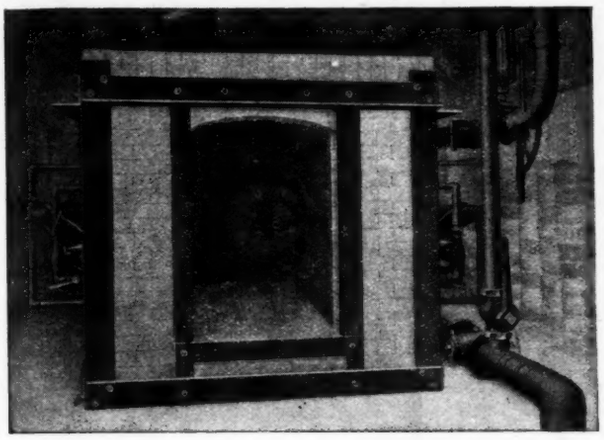
Oil Fuel Production at Bolton.—The Bolton Gas Committee, according to the "Bolton Journal," have decided to place their Lum Street works at the disposal of the Government for the production of fuel oil for the Navy. A representative of the Ministry of Munitions has visited the works and interviewed the Gas Engineer as to the use of the works; and on his report the Gas Committee decided to agree to the request of the Ministry.

Carbon Monoxide Poisoning.—The U.S. Government Printing Office, at Washington, have recently issued a pamphlet on this subject (says the "Chemical News") which aims at giving a brief account of industrial poisoning by carbon monoxide, for the use of those who do not wish, or have not time, to study the copious and detailed literature of the subject. The liability of workers in certain factories to such poisoning is shortly discussed, and the effects of the gas are described—especially the results of the inhalation of small quantities which are not sufficient to cause acute symptoms and may yet lead to total or partial incapacitation. Recommendations are made for preventing the pollution of the atmosphere, and for reducing the liability of poisoning, and short accounts are given of the best methods of taking and analyzing air samples.

Threat to Cease Work in Birmingham.—A meeting of the Amalgamated Society of Gas, Municipal, and General Workers was held on Sunday in Birmingham, when the award of the Committee on Production was explained. It was pointed out that the payment of the 12½ p.ct. increase was to take place from Feb. 14. The meeting objected to the award dating from then; the contention being that the payments should be retrospective to Oct. 13. A resolution was unanimously carried that, unless the award is so made retrospective, the men employed in the gas, water, and tramway permanent way departments will cease work on Friday night, until the matter is satisfactorily arranged. This decision affects 4000 employees of the Corporation, each of whom is now in receipt of a war bonus of 19s. 6d. per week. The majority of the men at one period of the meeting wanted to "down tools" on Wednesday night; but they were ultimately persuaded not to do so, as the Labour Committee are meeting on that day, and if the matter is settled it would be difficult to advise the workers of the fact.

GAS-FIRED POTTERY FURNACES.

Since gas began seriously to be applied as a fuel for industrial purposes, it has been a constant source of interest to observe the succession of fresh uses to which, by the perseverence and ingenuity of gas-furnace manufacturers, it is being applied. The most recent and one of the most striking illustrations of this is to be found in the successful use of gas as the firing medium in an industry so entirely special as that of pottery and china.



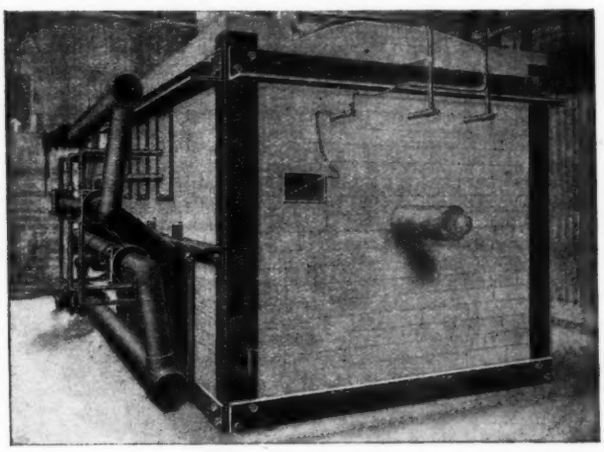
The German porcelain manufacturers had for a long period enjoyed a monopoly in this country of the sale of hard-paste porcelain—British manufacturers not knowing any process that would enable them successfully to compete. Some year or two ago, the Government gave a substantial grant in order that certain valuable research work should be carried on in the Potteries district with a view to arriving at such methods as would overcome this difficulty. Dr. J. W. Mellor and Mr. Bernard Moore, of the Central School of Science and Technology, Stoke-on-Trent, were the leading pottery experts to whom the conduct of the work was entrusted; and finding that certain essential operations required altogether better means of firing than those hitherto available, these gentlemen called upon the Brayshaw Furnaces and Tools, Ltd., of Manchester (who are associated with the firm of John Wright & Co., of Birmingham), to design and construct a gas-furnace for experimental work. At the same time, it had to be sufficiently large fairly to reproduce the conditions which obtain in a big oven for high-class pottery, earthenware, and china. Accordingly, the firm put in hand a kiln for sixty saggers; and recognizing that full control over the firing was essential, they spent many months in perfecting the design and construction of the new apparatus by means of which the problem of suitable firing was solved. One of the furnaces has now been in use for some time in connection with the research work referred to; and Dr. Mellor and Mr. Moore have found it an unqualified success.

The "Porceflam" furnace, as will be realized from the illustrations, is a large apparatus. It embodies more than one patent, and is suited for all the usual classes of pottery up to and including the finest chinaware. It is the belief of the designers and makers that the "Porceflam" has before it a future of wide usefulness, as opening up yet another fresh use of gas in a field not hitherto worked.

Some brief description of the new apparatus will be of interest to readers. The "Porceflam" is made to use town's gas at ordinary pressures. The two essential features of the furnace are, naturally, the burner arrangements and the construction of the furnace itself. Dealing with the first of these, the gas is burned in the makers' patent "Flamos" burners, which form a new departure in furnace-burner construction. The burner is so designed as to allow the heat to enter the furnace from large mouths, instead of from small jets. The effect of this is to produce a much more gentle action in firing, owing to its greatly lowering the velocity of the currents within the furnace as compared with ordinary burners. In connection with the distribution of heat, the construction of the "Flamos" burner, together with the arrangement of inlet and outlet openings, is so contrived as to maintain a surprising uniformity of temperature throughout.

Another feature of advantage claimed for the "Flamos" burner is its entire avoidance of back-firing troubles. In conjunction with the gas supply, the air supply is used under a very slight pressure—seldom reaching so much as 8 in. or 10 in. head-of-water, and never more than this. The advantage of perfect control in the regulation of both the gas and air admission has been kept well in view, and the accuracy attainable in this regard could not be more complete. Should the burners require handling or replacement, the design is such that there is ready accessibility—practically without interfering with the furnace brickwork. The recuperation chambers run the full length of the furnace; and in them the gas and air are preheated before arriving at the point of combustion.

In an apparatus of this kind the question of substantial material is only second in importance to that of design; and the refractory material used throughout in the furnace body has been selected after prolonged experience as the most durable for pottery work



A furnace of such considerable size is naturally built in substantial fashion; and its design, construction, and the material used alike warrant confidence in the furnace giving good service and withstanding hard wear for a prolonged period.

Coke-Oven Gas Plant for Chicago.

To the "Gas Record" has fallen the privilege of publishing the first picture of an immense coke-oven plant which has been designed by the engineers of the People's Gas Light Company, of Chicago. Work has already been begun on the foundations of the plant, which is intended to have a total capacity of 100 million c.ft. of gas per day. According to the plans of the engineers, the plant will, when completed, consist of five units. These are to be built one at a time; the first to be finished before the second is started. In this way, the plant will be brought into service at the earliest possible date, without waiting until the whole of the construction work is done. It is anticipated that the scheme will enable the gas-producing capacity of the Company to keep pace with the normal growth of Chicago and the annual increase in the demand for gas. The new plant will, of course, be equipped with the best and latest kinds of conveying and stoking apparatus. The site of it is on the Chicago drainage canal, with ample transport facilities both by water and rail.

Midland Junior Gas Association.—There is to be on Thursday of this week a special joint meeting of the Midland Junior Gas Association and the Birmingham Section of the Society of Chemical Industry. The meeting will take place in the Birmingham Gas Department Reading Room, at the Council House; and the business will consist of a lecture by Mr. E. W. Smith, M.Sc., F.I.C., on the "Carbonization of Low-Grade Cannel in Continuously Working Vertical Retorts."

Canning Fruit and Vegetables.

Exceedingly opportune is the information contained in the special article appearing in the March issue of "A Thousand-and-One Uses of Gas;" the subject being the canning of fruit and vegetables. The particular apparatus dealt with is one modelled on the American "Royal Home Canner;" and what is said of it will make many housewives and groups of small growers anxious to possess the necessary outfit for the operation, the cost of which is put at about £6, carriage paid, according to the accessories required. The probability of miniature canners being soon on the market is hinted at; but for particulars in these respects inquirers are referred to the Food Production Department, at No. 72, Victoria Street, S.W. 1. The steam which sterilizes the produce can, of course, be generated by coke or other solid fuel; but it is pointed out that where gas is laid on this can be most conveniently and economically employed. Practically, all the ordinary varieties of fruits and vegetables can be treated. In the course of the article, it is shown how simple a process food-canning is; and the British Commercial Gas Association "earnestly counsel all fruit growers and fruit users—the whole community—to interest themselves in this matter, and do their share in saving the country's food."

The Statistical Report of the Gas Supply of Scotland from May, 1916, to May, 1917, has just been issued by the Council of the North British Association of Gas Managers. The pamphlet includes a list of members of the Association, whose Secretary and Treasurer is Mr. Peter B. Watson, Gas-Works, Wishaw.

STOKING MACHINES—A SIMPLE ELECTRICAL COMPENSATING GEAR.

By H. C. WIDLAKE, M.J.Inst.E., of the Plymouth and Stonehouse Gaslight and Coke Company.

IN placing this small contribution before the readers of the "JOURNAL," the writer trusts the simple device around which it is written may be of service to those who, like himself, are in responsible charge of installations of electrically operated stoking machines.

By electrical compensating gear is meant the arrangement by which an uninterrupted supply of electrical energy is ensured to the inner frame of a stoking machine, irrespective of its vertical position relative to the current collectors fitted on the outer or travelling frame. The necessity for a certain degree of flexibility in this respect arises from the fact that the height of the inner frame from the floor-level varies according to the particular tier of retorts on which the machine may be working. Thus a machine working on three-tier settings has to be so constructed that its inner frame will be capable of a vertical travel of about 5 ft.; while in the case of machines working on settings of ten retorts, arranged in two vertical lines, this distance will be increased to about 10 ft.

The exact number of electrical conductors in which this requisite degree of flexibility has to be provided depends upon the type of machine employed. In the case of a "De Brouwer" projector machine, in which the projector control gear is fitted on the outer or travelling frame (fig. 4), compensating gear has to be provided for three leads to the projector motor; while in the case of the Fiddes-Aldridge two-motor simultaneous machine—a very popular type, illustrated in fig. 2—in which all the control gear is placed on the inner frame, no less than six leads have to be provided with some form of compensating gear—namely, the two main feeder wires running from the current collectors into the inner frame, and four leads running from the inner frame to the separate travelling motor, which is mounted on the near sill plate of the machine.

It is an unfortunate fact that provision for taking-up the slack of such conductors as run between the inner and the outer frames of a stoking machine is often regarded as a sort of afterthought, with the result that this portion of the equipment is frequently the cause of a great deal of trouble and irritation, in addition to providing raw and prejudiced operators with a peg whereon to hang their complaint that the machine is dangerous.

The two most frequently employed methods of compensating for the rise and fall of the inner frame, so far as the electrical conductors are concerned, are shown side by side in fig. 1, in which Sketch A represents the counterweight system, and Sketch B the banjo-wire system. In the counterweight system, a two, three, or four core flexible cable is anchored to a point at the top of the outer frame C, and passes downwards over a heavily weighted wood pulley block D, from which it rises again to about the level of its anchored top end, passing over a second pulley block E, carried on one of the top members of the outer frame. It then falls vertically to a convenient point on the inner frame, to which it is finally anchored, and the necessary connections made to the conduit wiring system on the inner frame. As the machine rises and falls from one tier of retorts to another, it will be seen that this flexible cable is always kept in a state of tension by means of the weighted pulley block D.

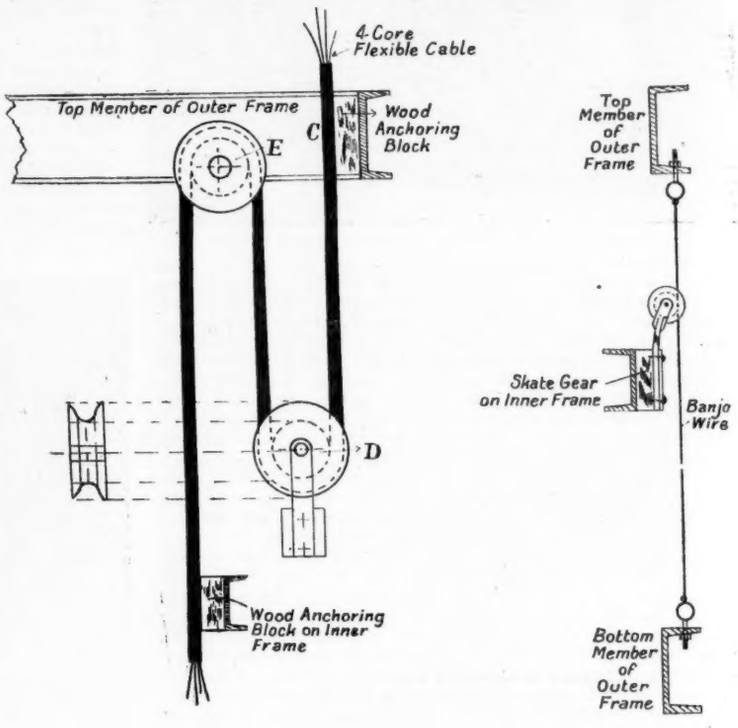
Although this system fulfils the purpose for which it is installed, it cannot be regarded as any other than ungainly and extravagant—the latter on account of the long length of expensive flexible cable which must be provided, and which becomes saturated with oil, grease, and coal dust. This tends to perish its insulation and on more than one occasion within the writer's experience it has been the cause of a destructive electrical conflagration. In addition to this objection, it is almost impossible to adequately guard the suspended cable against rough handling when repairs are being carried out, and it frequently becomes injured in this manner.

The system shown in Sketch B (fig. 1) may be described as an inverted trolley wire system, inasmuch as it consists of short lengths of bare trolley wires strained, *viâ* insulators, between the top and bottom members of the outer frame—as many wires being employed, strung in parallel about 3 in. apart, as there are conductors requiring compensation. At some convenient point on the inner frame, opposite these tension wires, an equal number of contact skates are fitted; each skate making a sliding contact with one of the wires—this contact being maintained at all positions of the inner frame by skate springs. The drawback to this method of compensation lies in the fact that good contact is only maintained so long as both skates and wires are in a reasonable state of cleanliness—conditions which it is difficult to guarantee on machines of this type. Deposits of coal dust and oil result in bad contact between the skates and their respective trolley wires, local heating is set up, and the result is that an open circuit fault is brought about.

Another objection is that the presence of lengths of bare live wires cannot be considered as other than dangerous; and any attempt to adequately guard these wires results in the guards employed masking the wires and skates, and thus preventing the discovery of incipient faults due to sparking and bad contact. With this system an extremely fine pyrotechnic display can be obtained by a careless workman letting his spanner fall against the wires. This can scarcely be said to be conductive to smooth working, and cannot be classed under the heading of advantages.

A NEW SYSTEM.

In figs. 2, 3, and 4 will be found some particulars of a new system of compensation which the writer has developed and applied to machines under his charge. Fig. 2 shows the device applied to a standard Fiddes-Aldridge two-motor machine. It may be described as a radial arm system, and dispenses entirely with sliding contacts and flexible cables; while the cost of compensating (say) six wires is very little more than the cost of providing compensation for two.



Sketch A. Sketch B.

Fig. 1.

Fig. 3 shows a bare plan of a Fiddes-Aldridge machine. It has been prepared to show the run of conduit on the inner frame relative to the control gear and the motor and the point at which it leaves the inner frame *viâ* the new system of radial arm compensation.

It will be seen on reference to figs. 2 and 3 that the screwed conduct is taken to one of the side channels of the inner frame at a point marked A on both the sketches. At this point it enters a long screwed socket, which is clamped to the underside of the channel at the point A by the method shown in the small sketch at top. Into the outer end of this socket a conduit bend is screwed; and from it, and in the direction of the rear of the machine, is led a piece of conduit of such a length as, when placed in the horizontal plane, to reach about 3 in. beyond the corner joist at the rear of the machine. The end of this conduit is suitably bushed, and is encircled with a special clamp of the form shown in the small sketch at the side of fig. 2.

Assuming that the inner frame is placed at a position midway between the limits of its vertical travel—namely, on the middle tier of retorts in the case of a three-tier machine—this length of conduit is placed in the horizontal position, and is suspended to a fixed pin projecting from the top of the outer frame by means of a piece of ½ in. gas-pipe having each end flattened out and then drilled. The method of fitting will be readily followed by reference to the figures mentioned, and also to fig. 4, which shows this same type of gear applied to a "D.B." projector machine.

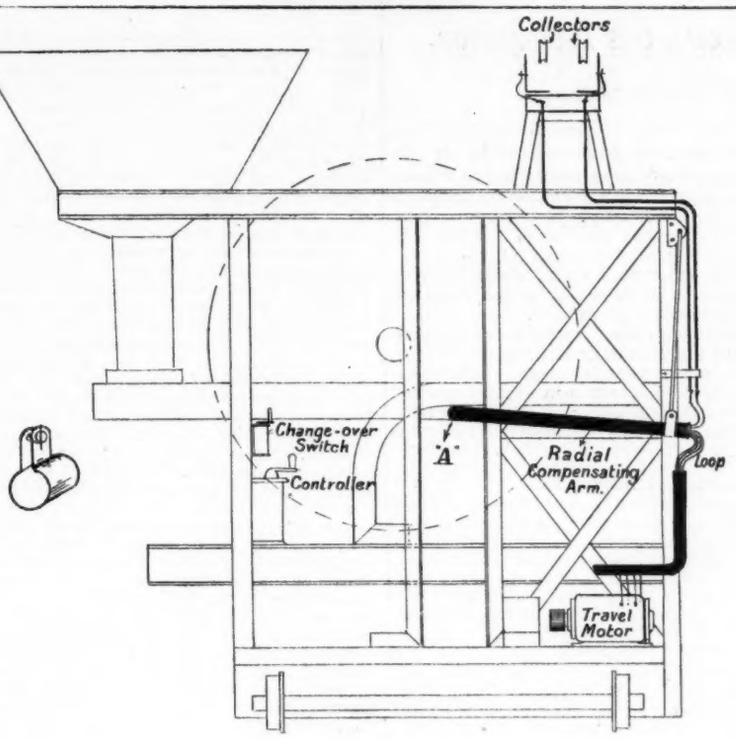


Fig. 2

In the case of the "F.A." machine illustrated, six wires have to pass through this compensating gear—namely, two trolley wires from the overhead collectors, and four wires to the travelling motor on the sill plate of the outer frame. The two former are

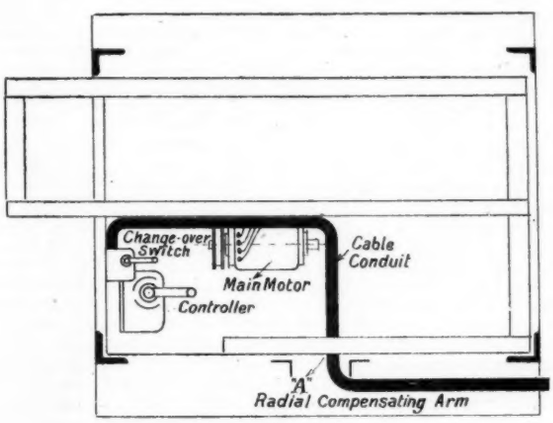


Fig. 3.

led down from the collectors, *viâ* two small conduit runs terminating about 6 in. away from the bushed end of the compensating conduit arm, while a short length of 2 in. conduit is run up from the travelling motor to within about 6 in. of this bushed end.

In wiring-up, it is desirable that a small amount of slack cable should be allowed in the form of a loop in each of the six conductors, at the point at which they enter the compensating conduit arm, in order to compensate for the small horizontal movement which takes place at the end of this arm as the inner frame rises and falls. The ends of the four conduit lines are all fitted with good substantial insulating bushes, and ordinary 7/16 or 7/14 S.W.G. cable (V.I.R.) is used for wiring.

It will be readily understood that, with this arrangement, as the inner frame rises and falls, the wires issuing from the suspended end of the conduit arm are always kept at approximately the same level, and from this point can be conveyed in rigid conduit tube to any desired position on the outer frame. In the installation of machines now under the writer's care, the introduction of this simple form of compensating gear has been attended with great success after both the banjo wire and the flexible conductor system (fig. 1) had been given a long trial on different types of machines, and were finally scrapped in favour of the radial arm system.

In conclusion, although means for compensating (so far as the electric conductors are concerned) for the rise and fall of the inner frame are often looked upon as a minor consideration by designers of stoking machinery, it is essential that the type of gear employed shall be capable of giving good service under the hard conditions pertaining in practically all retort-houses. In the author's experience, these conditions are best met by the use of a radial arm system such as he has described.

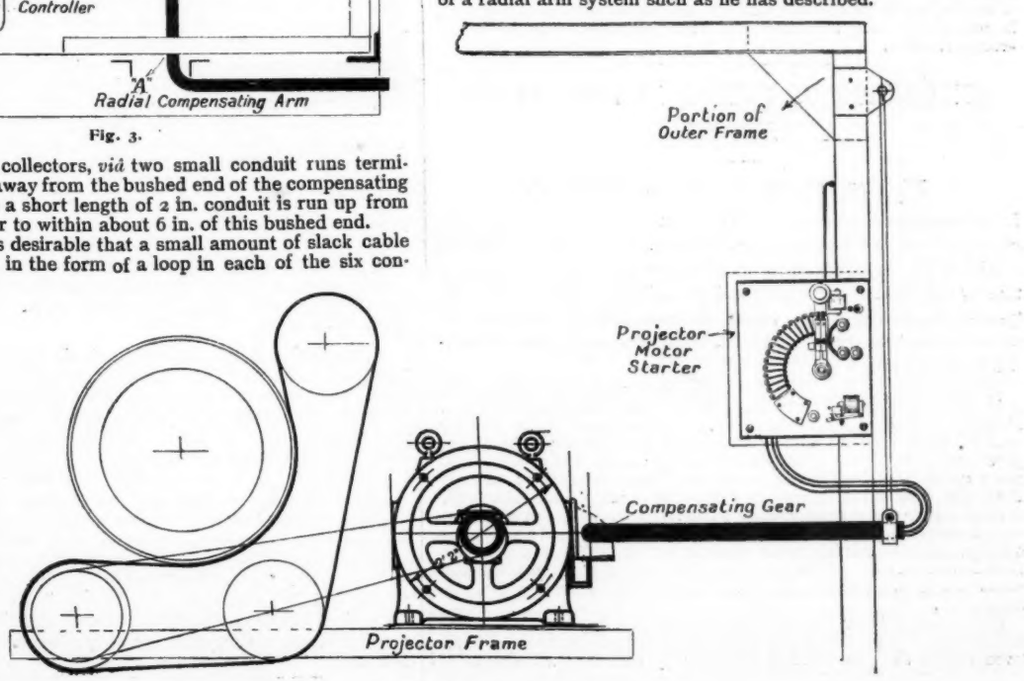


Fig. 4.

BRITISH COMMERCIAL GAS ASSOCIATION.

Report of the Executive Committee.

At a meeting on Monday last week, the Executive Committee of the British Commercial Gas Association submitted for the consideration of the General Committee a report, in the course of which it is stated that the work of the Association continues to receive additional support—six undertakings having been added to the list of subscribers since the last meeting of the General Committee. The subscription of the Scarborough Gas Company, which was reduced on account of temporary difficulties, has been renewed on the full basis. Three international members and an associate member were recommended for election.

It is reported that the Children's Prize Competition, as advertised in "Pears' Annual" and the Educational Press, proved an even greater success than the previous year's scheme. The report adds that the object of the competition is primarily to instil into the minds of the rising generation practical ideas as to the advantages of gas, especially in the home; and there is little question that this object is being attained.

An Important Investigation.

The Executive drew the attention of the General Committee to an important investigation carried out under their instructions at the Naval Hospital, Truro, relative to a complaint in connection with gas heating in the operating theatre. The research had some unique features; and it was considered of so much importance to the industry generally—especially in view of the satisfactory conclusions reached—that the correspondence and the report have been published in full in the "Bulletin."

Gas for Motor Traction.

As already announced in the "Bulletin" and the public Press, the Chairman of the Executive and Alderman W. Kay have been elected members of the Government Committee on Gas Traction, to represent the Association. The Executive Committee set up a Special Committee (composed of the Executive and co-opted members from the District Associations) to consider the subject; and recommendations were adopted by this Committee to form the basis of a memorandum to gas undertakings, with a view to securing uniformity in practice as far as possible.

The issue of the proposed memorandum to the industry has been purposely deferred while evidence is being submitted to the Government Committee, which would possibly lead to a modification of the decisions arrived at by the Association Committee, as has already been the case in respect of the proposed standard coupling.

The Committee selected Messrs. W. M. Barrett (Manchester), J. G. Clark (London), and R. Halkett (Glasgow) to prepare and lay before the Government Committee evidence on behalf of the Association. Their proofs were considered by the Association Committee; and they were later heard by the Government Committee.

A first list of gas filling-stations, compiled in conjunction with the Commercial Motor Users' Association, has been issued; and copies have been sent to all undertakings with an annual make of 20 millions and upwards.

"A Thousand-and-One Uses for Gas."

Special attention is drawn to the recent issues of "A Thousand-and-One Uses for Gas" dealing with "Home Canning," "Coke for Steam Raising," and "Women in the Gas Industry in War Time." It is added that the "Coke Number," in particular, should be of great value to all gas undertakings in developing the use of coke in place of coal for boiler-firing. The Executive suggest the early formation of District Committees for pushing the local sale of coke throughout the country, and hope to secure the co-operation of the London Coke Committee in developing in particular the use of coke for steam-raising purposes, in respect of which they have met with conspicuous success in and around London.

EXTRACTION OF TOLUOL IN THE UNITED STATES.

Effect on Existing Gas Standard Regulations.

In a communication to the "Gas Record," published by permission from the Bureau of Standards, Mr. R. S. M'Bride, an official in the department, summarizes the effect of toluol extraction on the illuminating power and the calorific value of gas, with typical illustrations and general recommendations that will be necessary in changes of standard, if the operation is to be effectively carried out.

Several cities in New York State, Connecticut, Iowa, Omaha, Illinois, &c., are at present under obligation to supply 20 to 23 candle gas. New York City may supply 650 B.Th.U. gas, or lower quality at a *pro rata* reduction in price; and in other cases, 600 and 565 B.Th.U. are prescribed. In Michigan and California, 18 candles and 600 B.Th.U. are required. Massachusetts is satisfied with 16 candles; and the State Commission has recently recommended a 528 B.Th.U. standard. A large number of cities are under a 600 B.Th.U. limit, and others at various lower figures down to 550. Many are under no standard of quality, but maintain a "good illuminating power" and a little less than 600 B.Th.U. Quite a long list of these is attached, to whom the extraction of toluol means no more than retaining the good will of the consumers.

The benzol and toluol content of a gas are to a large extent an indication of both the lighting and heating value, because the conditions favourable to the production of aromatic hydrocarbons are also conducive to a high-quality gas. The quantity of toluol and other light oils in carburetted water gas depends upon the amount of gas oil used, of which 10 p.ct. can be recovered as light oil, representing about 2 p.ct. of pure toluene. From coal gas manufactured in horizontal retorts, ¼ to ½ gallon of light oil, equal to nearly a gallon of toluene, can be extracted. The heating value is reduced by 10 to 14 B.Th.U., and the illuminating power 2½ to 3 candles, for each one-tenth gallon of light oil recovered per 1000 c.ft. of gas. By the restoration of the benzol fraction to the gas, the loss may be partly, and by the addition of an excess of benzol entirely, covered, as the enriching power of benzol is about the same as the loss indicated. At present prices, however, a complete return to the original quality is out of the question.

As the distribution of untreated gas is always attended with loss by condensation in the mains and services, these estimates are excessive, as regards actual difference to the consumers. But they may serve as a guide for estimating the extent of readjustment of standards, or of the yield that may be expected. If 4 gallons of oil per 1000 c.ft. are used for making carburetted water gas, the quality of the product will be 20 candles and 625 B.Th.U.; and 0·4 gallon of light oil, equal to 0·08 gallon of toluene, may be extracted. The effect would be a reduction of the candle power to 10, and of the heating value to 575 B.Th.U., if none of the benzol was returned; but by restoration of the benzol fraction, it could be brought up to 15 candles, and 600 B.Th.U. A high quality oil and efficient working might secure an 18 c.p. and 570 B.Th.U. gas, with a use of 3 gallons per 1000 c.ft., which would yield, by complete washing, 0·3 gallon of light oil and 0·06 gallon of toluene; leaving a gas of 10 c.p. and 530 B.Th.U., which could be raised to 12 candles and 550 B.Th.U. by restoration of the benzol. A mixture of equal parts of coal and carburetted water gas, for which 3½ gallons per 1000 c.ft. was used, would possess a quality of 16½ candles and 590 B.Th.U., and would yield about similar quantities of both light oil and toluol, reducing the gas to 8½ c.p. and 550 B.Th.U.; and half this reduction could be recovered by benzol restoration. These figures also represent the results that might be expected from a straight 14 c.p. and 585 B.Th.U. coal gas.

If such reductions are not compatible with the standard, other constituents of the light oil, such as solvent naphtha, might also be returned to the gas, or the washing could be limited to 75 p.ct. or even 50 p.ct. efficiency; but as this would mean a *pro rata* loss of toluene, complete washing and subsequent benzol restoration is preferable.

As the effect of stripping is more evident on the photometer than on the calorimeter, the candle standard should be substantially reduced, or, better, entirely eliminated, as there are other reasons in favour of this course. Where not more than 18 candles has been the rule, there is no objection; but in the case of a higher standard, a change of this nature should be graduated, by supplying (say) 14-c.p. gas for a period sufficient to admit of a general adjustment to the new conditions. In cities supplying coal gas chiefly or entirely, a calorific standard exceeding 570 B.Th.U. would not be compatible with complete removal of toluene; but if carburetted water gas was the entire or leading constituent, 585 or even 600 B.Th.U. may be practicable. If oil is fairly cheap, an initial increase sufficient to cover the reduction in quality might be the best practice. From the Government point of view, the highest initial quality is desirable; but, of course, economy in operating must be considered.

Superheated Steam for Gas-Retorts.

As the question of steaming retorts with the view to increase the yield of gas and ammonia is now to the fore, the idea of employing superheated steam at a high temperature is likewise receiving attention. We understand that, under the ægis of the enterprising Mr. F. D. Marshall, a party of gas engineers, representing Messrs. Woodall-Duckham and Messrs. Appleby & Co., Mr. A. E. Broadberry, Colonel N. Wilson, R.E., of the Ministry of Munitions, Mr. Cunnold, and others, lately visited the works of the High-Temperature Generators Company, at Kensington, where the process of producing superheated steam by novel arrangements was explained, and the methods demonstrated on a practical scale by the Engineer of the Company, Mr. F. Bynoe. From what we gather, with only 8 lbs. of steam-pressure, a temperature of 1000° to 1500° Fahr. can easily be obtained. The appliance is applicable, too, to the superheating of air, and much that has hitherto been obscure in this respect has been elucidated. Some interesting experiments with both superheated steam and air were carried out on the occasion of the visit. We are promised by Mr. Marshall a full description and plans of the process for publication in the near future.

Coke-Oven Managers' Association.—There will be a meeting of the Midland Section at Sheffield on the 23rd inst., when Prof. W. G. Fearnsides, M.A., will read a paper on the "Texture of Coke-Oven Bricks."

Disabled Soldiers and Workmen's Compensation.—The Home Secretary has appointed a Committee (with Lord Peel as Chairman) to consider and report whether any special provision should be made in the case of disabled soldiers and sailors returning to civil employment with regard to the payment of compensation under the Workmen's Compensation Act. The Secretary of the Committee is Mr. G. R. A. Buckland, Home Office, Whitehall.

Examinations in Coke and Bye-Products Manufacture.—The City and Guilds of London Institute (Department of Technology) announce that arrangements have been made, provided that a sufficient number of entries is received before the 13th inst., to hold examinations on Wednesday, April 24, in two grades, in "Coke and Bye-Products Manufacture." It is understood that the subject has been added to the Department's list at the request of the Education Committee of the Coke-Oven Managers' Association.

SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Forty-Third Annual Meeting.

The Annual Meeting of the Association was held last Thursday, at the Royal Society of Arts, John Street, Adelphi. Mr. W. N. WESTLAKE, of Exeter, the retiring President, occupied the chair during the first part of the proceedings.

MINUTES CONFIRMED.

The HON. SECRETARY (Mr. H C. Head, of Winchester) submitted the minutes of the last meeting. These consisted of the report published in the "JOURNAL," and, it being agreed to take them as read, they were confirmed.

ANNUAL REPORT.

The annual report of the Committee was next presented. It reviewed the proceedings of the year. Towards the end, reference was made to the paper read by Mr. John West at the previous meeting on "The Most Economical Method of Carbonizing Coal for Supplying Light, Heat, and Power by the Gas Industry, and the Maximum Supply of Munitions of War." Concluding the allusion to the paper and discussion, the Committee remarked: "The meeting was largely attended; and it must have been especially gratifying to our old friend to find so many of his old professional colleagues gathered together to listen to him—thus recognizing his thoughtful selection of the Association as the medium for publishing his data on such an all-important question." It was also mentioned that no less than twenty-four new members had been enrolled during the year. But while the Association has good reason to be proud of the influx of new members, it is a matter for deep regret that the Committee recorded the death of five members—viz., Mr. Thomas Brace, of Monmouth; Mr. W. D. Child, of Romford; Major R. H. Collins, of Blackheath (killed in action); Mr. B. Green, of Mitcham; and Mr. W. Wyver, of Whitstable. In addition to the foregoing losses, four others have resigned their membership. The financial condition continues satisfactory. Subscriptions received in respect of the year amounted to £99 15s.; while the expenditure was only £90 10s. 9d. The Committee also reported that last February opportunity was taken to invest £50 in 5 p.ct., War Loan at an initial cost of £47 10s.

The PRESIDENT, in moving the adoption of the report, said he would not detain the members very long. In the first place, he had to refer to the death of five members whose names were mentioned in the report. They were the names of gentlemen all well known among them; and they were exceedingly sorry that these friends had passed through the vale from their sphere of usefulness. Perhaps he ought to mention specially the death of Major Collins. He was a gentleman well known in the east of their district; but not so well known probably in other parts. He took a prominent position here, especially in connection with the Regent Street Polytechnic. The members of the Association were honoured in having a member who in this big crisis of the country had laid down his life in the cause of freedom. The next point he should like to allude to was the large number of new members added to the roll. This was very gratifying; and he hoped for further progress this year. As to the finances, they had finished up the year with something in hand from the revenue, notwithstanding that the business that had had to be dealt with had been rather more than usual. They had had to have extra meetings, which had cost more money. They had also been able to help the country by investing £50 in 5 p.ct. War Loan. It was also extremely gratifying that certain of their members had so distinguished themselves that they had been honoured. Mr. Doig Gibb had had conferred upon him the Order of the British Empire; and they ought to pass a vote of congratulation to him. He (Mr. Westlake) knew of the hard work Mr. Doig Gibb had been putting in. Then Major Bywater, who had been doing excellent work at the Front, had won the Military Cross. They ought to include him also in the congratulations; and, in moving the adoption of the report, he would add that the congratulations of the members be tendered to these two gentlemen.

Mr. JAMES W. HELPS (Croydon) remarked that the President had omitted Lieut.-Col. Harold Woodall.

The PRESIDENT said he was sorry for the oversight. Lieut.-Col. Woodall had been mentioned in despatches; and he was very pleased to incorporate his name in the resolution.

Mr. W. B. FARQUHAR seconded the motion, which was unanimously passed.

ELECTION OF NEW MEMBERS.

Moved by the PRESIDENT, and seconded by Mr. H. BUCKLEY (Windsor), the following six gentlemen were elected members of the Association: Mr. George Fenwick, of Yeovil; Mr. W. T. Burton, of Leatherhead; Mr. T. W. E. Corrigan, of Brixham; Mr. T. Shadbolt, of Swindon; Mr. F. S. Smith, of Reigate; and Mr. E. J. Hobbs, of Sittingbourne.

TECHNICAL EDUCATION FOR GAS ENGINEERING STUDENTS.

The PRESIDENT said he had asked the Hon. Secretary to put this subject on the agenda because he felt that some recognition and probably an apology was due to Dr. Newman, of the Battersea Polytechnic, and Mr. Wilson, of the Department of Applied Chemistry at the institute, because the subject was not mentioned at the last meeting, owing to the pressure of business on that occasion. The position of a gas engineer to-day was altering; and although the technical qualifications of the gas engineers of the past had not by any means been below what they should be, he thought they would all admit that, in common with all other technical industries, the average technical training of the gas engineer might be raised, and particularly at this time when the technical side of every industry was being overhauled owing to the shaking up which all had had during the war. There were a number of institutions existing now for the technical training of gas engineers. There were several in London; but it appeared to be generally considered that they were not sufficient. So the authorities at the Battersea Polytechnic had decided to start a three-years' course—a gas engineering and a chemical course—particularly suitable for gas engineers. The question was brought to the notice of the Association; and he (the President) had the pleasure, with Mr. Head, of going through the college last October. They were heartily welcomed by Dr. Newman and Mr. Wilson, who took a great deal of trouble to show them over the establishment; and both Mr. Head and himself were particularly struck with the equipment they had there for practical training. He was sure the members would do the industry a benefit if they could see their way to co-operate with the Polytechnic in furthering the scheme. Preliminary arrangements had been under the consideration of two of the members—Mr. H. O. Carr and Mr. C. A. Cunnold; and they had taken considerable trouble in putting the views of the industry before the Polytechnic authorities. The way the members could help was by making the course known; then by sending some students to the Polytechnic—not necessarily from only just round about London, but from farther afield; and, further, by applying for assistants to the Polytechnic when there were vacancies in works. If assistance of this description could be given, he was sure the course would develop into a successful institution; and it would be another place upon which they could rely for the training of suitable men for the industry. This was a difficult problem for engineers down in the district from which he came. It was a scattered district, where the engineers were few compared with the district round about London. But he was in hopes something might be done in the West of England before very long. They were making a big effort there to blossom out in some way with a University.

Mr. CUNNOLD (called upon by the President) said there was no need for him to say much with regard to the high reputation already attained by the Battersea Polytechnic as an educational institution. It was well known that it ranked with the highest of its kind in the kingdom and had attracted students from a very wide area. The prominence which gas matters had obtained during the war period was probably the chief reason which led Dr. Frank Newman, the Head of the Polytechnic, to conceive that there was urgent need for highly trained men, especially chemists, in the gas industry, and made him anxious to take immediate action with a view to satisfying this need. He had been successful in establishing special courses of instruction and training in connection with local manufacturing and chemical undertakings; and he was the more desirous of including the gas industry among them, seeing that, within a short distance of the Polytechnic, there were at least four large Metropolitan Gas-Works. He therefore invited representatives from some of these to attend the annual meeting of the Advisory Committee of the Chemical Section of the College early last summer; and Mr. Carr himself accepted the invitation. They were then asked to assist in drawing up a syllabus of a special course for gas-works students; and the outcome of one or two subsequent meetings with the College staff was contained in a page of this session's "Calendar" of the Polytechnic, which, under the heading, "Gas Industry," outlined a course of training and instruction which he might summarize. The special course was provided for the training of fully-qualified chemists in connection with the gas industry. The students must be over sixteen years of age, have a knowledge of chemistry, physics, and mathematics, and enter for a three years' course of study, which embraced inorganic chemistry, organic chemistry, physical chemistry, physics, mathematics, chemical engineering, gas manufacture, technical analyses, industrial economics, and (he did not know who suggested this) German. The general standard of chemical knowledge aimed at was that required for the B.Sc. Honours Degree in Chemistry of the University of London, with two important additions: (1) More advanced work than was covered by the syllabus of that examination, coupled with experience in technical analyses actually performed in gas-works. (2) Some training. Visits to some of the larger Metropolitan Gas Companies' works form a part of the curriculum. It would be seen that, in the main, the course was a general chemistry course, and would enable a student to qualify for employment in chemical industries other than the gas industry, while specially qualifying himself for work in this industry. Stress was laid upon the student doing a considerable amount of actual technical analysis; and the training in chemical engineering and industrial economics should give him some insight (elementary, of course) into the modifications which had to be made in developing from laboratory experiments to practical commercial processes. Mr. Carr laid particular stress upon the necessity for providing ample apparatus, so that each student could perform laboratory experiments and analysis for himself, and not be obliged to content himself with watching an assistant master do the work. As it stood, he (Mr. Cunnold) thought the members would agree that this syllabus was comprehensive and adequate. An obstacle to its wide application and development was, of course, the war. Obviously, a lad now entering upon such a course of technical training at the age laid down, would be claimed by the military authorities before he could complete two-thirds of the course; and, though they heard of applications being made to the Government for something to be done so that the need for trained junior chemists could be met, he was afraid they could only look to the "after-the-war" period for any relaxation of the military grip upon their young manhood. Meantime, he felt they were indebted to Dr. Newman and the Battersea Polytechnic staff for having so carefully thought-out their scheme of instruction and training. The high reputation enjoyed by the Polytechnic was a guarantee of the thoroughness with which the work would be carried out; and it was a matter for much regret that the course was at present, owing to the war, one of limited interest to their young men.

Mr. WILSON (invited by the President) remarked that after the clear

exposition made by Mr. Cunnold of the objects they had in view at the Battersea Polytechnic, a very few words from him would suffice. What they had felt was that the increasing complexity of the gas industry—complex as it was already (and no one knew what it would be in ten or twenty years)—necessitated more specific specialized instruction than was provided by the educational institutions of the country; and the Battersea Polytechnic desired to step into the breach and fill the gap. They realized that the instruction given in the evening to young men in the industry was excellent from many points of view. These evening classes had done, and were doing, good work. But that form of instruction did not adequately fulfil the high scientific and technical requirements demanded by the gas industry to-day, and which would be demanded to a greater extent in the future. They felt they ought to go for a three or four years' definite day course. They decided to recommend a course mainly chemical with a sufficient amount of engineering in it, so that the student could fit in with the requirements of a gas-works, and be able to co-operate with the engineering side after some instruction with the appliances and equipment upon the works. They felt, however, that the chemical training should be of a high scientific character; and they also followed the excellent suggestion of Mr. Carr as to practical work being done by the students themselves. They were very much indebted to Mr. Cunnold and Mr. Carr for the very practical suggestions they had made.

Mr. J. FISHER (Tottenham) asked what would be the approximate fee for a student attending the course; would he be trained sufficiently to take his B.Sc. degree at the London University; and was the scheme absolutely in operation?

Mr. WILSON replied that the fees were thirteen guineas per session lasting from September to July, or five guineas per term. Assuming students had passed the matriculation, they should be able to obtain the B.Sc. degree of the University. A circular was issued last year; but, owing to the war, they only obtained one student. They were hoping, however, to secure a larger success through the aid of the members of the Association.

The PRESIDENT assured Mr. Wilson that the members of the Association would do all they could to help in this important matter; and he hoped that the Battersea Polytechnic would mean a great deal to the industry in future.

THE NEW AND RETIRING PRESIDENTS.

The PRESIDENT, in a few graceful words, inducted the new President—Mr. W. B. Farquhar, of Ilford—to the chair.

Mr. FARQUHAR, on taking the chair, was cordially received. He thanked the members, and then proposed a hearty vote of thanks to the retiring President (Mr. Westlake) for his work as President during the past year—a year which had made many special claims upon the President.

Mr. J. W. WHIMSTER (Bath) seconded the motion, which was cordially passed.

Mr. WESTLAKE, in the course of his acknowledgment, mentioned the gratitude which he felt for the great assistance rendered to him by the Hon. Secretary throughout his year of office.

DISTRICT REPRESENTATIVE UPON THE INSTITUTION COUNCIL.

On the proposition of Mr. S. O. STEPHENSON (Worthing), seconded by Mr. R. W. BEYNON (Torquay), the President was appointed District Representative for the Council of the Institution of Gas Engineers.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—In present conditions, the drafting of an address is no small task, particularly when the writer feels that so many of the subjects usually touched upon in presidential addresses have been very fully ventilated, either at special meetings or in the Technical Press.

THE WAR AND ITS EFFECTS.

I regret that it is impossible to forget this terrible war, which is shaking the whole world to its foundation, and taking toll of the very flower of our manhood. Its effect on our industry is ever before us. During the past few years we have had to modify the whole routine of our business; and it has forced upon us the necessity of departing from many of our ordinary orthodox methods of working. Whereas in pre-war days it was possible to work out our plans year by year, it is now a case of having to meet special conditions and circumstances day by day. Influences are at work tending to revolutionize not only our works' processes, but also our whole general policy. While we must, and do, regret the cause of these many changes, I think the gas industry will pass through the refining fire, and come out stronger and better to take its place in the first rank of national industries. These changes to my mind, although they may not appear so at the moment, are all part of a strengthening scheme; and it is up to every one of us to keep them in mind, so that when we get back again to normal conditions, due advantage can be taken of the lessons they have taught us. The day of sitting down and taking things as they are, has passed away; and success will only be for those who are ready to look upon new suggestions as a basis on which to further extend their business.

War conditions have brought forward many new ideas, some of which are only suggestions to meet the immediate necessity of the times; others being more of a permanent nature. It is quite within reason, however, to foresee many of the temporary kind ultimately developing into a recognized part of our permanent system of working. It is only a few short months ago we had the pleasure of hearing an interesting paper on steaming in vertical retorts—a process of gas manufacture which is going to have a far-reaching effect. There is the suggested use of blue water gas made in a separate plant; and while this is not a new idea, it has again been prominently brought forward before gas engineers owing principally to the shortage of gas oil. We have also had raised the question of low-temperature carbonization, whereby it is claimed that the greatest amount of essential residuals may be produced out of the coal; and quite recently there has been brought to our notice the new "Pleno" gas, for which many advantages and claims are made. There are a host of other schemes and suggestions upon which I need not touch, but with which, no doubt, you are all fully conversant. It is certainly our duty to give them all very serious consideration, treating them as sound propositions until they can be or are proved otherwise. We can all more or less bring to mind many suggestions which, when first made, were coldly looked upon by outsiders, and yet in course of time they became recognized and adopted as an established part of gas-works management.

The many difficulties experienced by engineers have been steadily growing ever since the beginning of hostilities, and each day finds us faced with many new acute problems, not only respecting the engineering side of our business, but also those which affect the commercial stability of the companies under our control. Many of these difficulties we hope to be only temporary—such as the shortage of labour, and the difficulty of procuring the necessary materials. These, in course of time, will no doubt right themselves. One of the greatest problems, however, and the most serious to my mind, is the question of extensions required to meet the growing needs of our particular districts. There are many works at present equipped with plant which is quite inadequate for their requirements. In these cases extensions become an absolute case of necessity. This position of affairs with regard to many of the works is no discredit to the engineers, as it has been brought about by a chain of circumstances over which they have had no control whatever. Extensions which were contemplated four years ago have had to be cancelled, and even work which was progressing at the commencement of the war has been stopped through inability to procure material and necessary labour. All this harassing trouble has put a tremendous strain on gas management; and it certainly reflects credit on the profession generally that they have managed to carry through their obligations under most trying conditions. The carrying out of extensions after the war is only an ordinary engineering matter; but, looked at from the financial side, there is no doubt it is going to be a very serious and difficult question.

Engineers having at heart the interests of their respective companies, are greatly concerned at the enormous capital expenditure which will be necessary to put down new plant. The strength of a gas company is naturally the amount of capital laid out in building-up the business; and this fact must not be lost sight of by them when considering their respective needs. Capital unwisely or recklessly spent becomes a permanent burden on the undertaking, and is a great factor for or against a supply of cheap gas. There appears to be a general feeling that the high price of material and wages will continue for some years after the war. The question therefore arises in one's mind as to whether it is wise to postpone new extensions (where these can be carried out). To my mind, this is a mistake. It is, of course, very necessary to determine between what are essential extensions and what might be termed "convenient" extensions. Naturally, it is also a sound policy to proceed with any extensions which will show a saving in the handling of material and labour costs. You will no doubt be aware of the steps which are being taken by some companies in asking for permission to issue redeemable stock. This is in my opinion a most excellent arrangement; and I think a general scheme ought to be brought into operation to enable all companies to take advantage of this. It is impossible to expect the banks to finance right up to the fullest amount which will be required for our future needs; and unless some steps are taken as indicated above, we shall find companies saddled with very high capital charges.

COAL.

The subject of coal is always uppermost in our minds; but, never has it received more attention, and been so much discussed, as during the past year or two. This very necessary material always takes a prominent place at any meeting of gas managers. This is only to be expected, as it forms the rock-bottom foundation on which the whole of our industry is built. The position with regard to stocks and deliveries, particularly during the past winter, have in many instances occasioned grave anxiety and trouble to gas engineers. The distribution scheme of coal, whereby gas-works have been forced to secure coal from allotted coal-producing districts, necessitated the cancelling of many contracts; and not only was it difficult to procure fresh supplies to make up this loss, but the substituted coal itself was not of like quality. We must give the Government officials full credit for trying to work this business to meet the needs of the country at large; but there are I think a number of gentlemen in the gas profession who have a feeling that things might have been arranged better. Not only have supplies of coal occasioned great concern, but the quality likewise has deteriorated to such an extent as to raise protests from the whole industry, as well as from individual gas managers. I do not propose touching further on the quality of coal, as this is a subject to be ventilated in another direction, which will give the opportunity of discussion by members, and which I hope will be fully taken advantage of. We desire to make our protest with as strong a voice as possible, so as to get this most serious matter remedied.

The question of future deliveries and contracts appears to be at the moment somewhat uncertain. On making inquiry in regard to fresh contracts for my Company, I have been advised that there is no need to sign contracts—the supplies and deliveries of our present coals being automatically continued in the proportions allotted to us at the moment. On the other hand, I have heard from various managers that they have had to make fresh contracts, but have been advised of a certain percentage reduction on new deliveries as compared with their present contract amounts. Whether this is a colliery matter, and will only relate to certain classes of coal, I am not prepared to say. The fact, however, of certain works having their contracts cut down, if it is a case of coal shortage, will affect the whole industry, as these particular works will have to go further afield to find more coal. This will consequently mean robbing other gas companies.

While on the subject of coal, might I be permitted to comment on the effect of irregular deliveries, and, consequently, the removal from stock of reserve coal, which has again to be replaced later. You are no doubt aware of the considerable number of serious fires occurring in coal heaps, and due to spontaneous combustion. Possibly many present have had this most unfortunate experience lately. It is, of course, general knowledge that the larger and deeper the heap the more likelihood there is of it heating; but this can be avoided to some extent if the heap is gradually increased, and not dumped down all at once—keeping the depth within reasonable limits. A heap of this description which has successfully weathered the heating process ought to be reserved; and it should be the Government department's duty to see that it is retained by the gas company as a real emergency stock. It is a safe stock to have, and will not deteriorate any further than it has gone; whereas if the particular works has to use this up and again replace with fresh coal, there is always the danger of fires taking place. In addition, there is the extra handling, and the fact that two or more stocks of coal have deteriorated instead of one. The question of this extra handling is certainly an important item. I have in my own works seen men on a coal heap day after day shovelling coal into carts for removal to the coal-stores, through irregular deliveries of coal to the station. Had our supplies come forward in regular quantities, this would have been obviated and the necessary labour put to much better use. Besides, as I have already mentioned, the fact of eating into stocks is very unsatisfactory.

OIL.

This is a very interesting and difficult subject upon which to make any comment, particularly with regard to future deliveries. We are entirely in the dark as to how we stand regarding fresh contracts, and as to the amount which will be allotted to us. Never was a supply of cheap oil more needed than it is to-day, hampered as we are with such poor quality coal. The result of cutting down oil supplies has made itself felt in many works during the past winter; and it would seem from general observation that we have yet to experience further inconveniences in this direction. It is not a question of engineers of to-day desiring to use more oil than is really needed—the cost will naturally prevent this; but there are conditions and works where the supply and use of a certain amount of oil are absolutely essential.

During the winter months many works have had in operation their full retort plant, and have looked to their carburetted water gas plant not only as a means of increasing their gas supply, but as a help towards the quality. As already mentioned, the question of the use of blue gas has been suggested and successfully used. It is in every way quite a sound workable proposition; and no doubt many engineers have been very much relieved by the use which they have made in this direction. All engineers, however, have not been in a position to take advantage of this proposal; their working conditions not allowing them the necessary latitude to do so. It has been a case in many instances of every spare piece of plant being at work during the heavy period of winter gas making, and with only sufficient labour available to get through each day's allotted task. In looking over the returns of petroleum products imported into this country, I notice that the year 1917 showed a considerable decrease as against the imports of 1916; the 1916 figures again showing a decrease on the year 1915. The extra use to which this oil is now being put, together with these decreases, is having a very great effect upon our supplies; and I think we may look on the position as being a very serious one.

COKE.

Unfortunately, the coke market at present is not very promising. Stocks have been growing at a time when there ought to have been a good demand; and now that we are getting over the winter—which so far has been a very open one and not helpful to coke sales—there is every likelihood of our yards being taxed to their uttermost to find storage space. We all know the effect of storing coke, the amount of breeze which it produces, and consequently the quantity of valuable fuel lost. There is also the tremendous waste of time in stacking this coke, particularly in works where it has to be done by hand labour. The situation is certainly a peculiar one. We hear on all sides the question of coal shortage and the difficulty of procuring it, and yet our yards are full up with a most valuable fuel for which there is no demand. I understand that steps are being taken by the Coal Controller with regard to these coke stocks; and I am sure we all hope some solution will be found to relieve us of this material. It is only a common-sense proposition that this should be done by the Government, as every ton of coke sold, either for household or factory use, is saving transit on an equivalent amount of coal on the railway. The question of trucks at the moment is a vitally important one; and any means by which truck space can be saved should be gladly welcomed.

WAGES.

It is a matter of grave concern, and one of the hardest problems which we have been called to face—this most important question of wages. The gas industry cannot be accused of being low wage-payers; and I am sure that all right-thinking men in the profession desire to see that no injustice is done to their employees in this direction. Fresh demands are again before us. These, in the opinion of many, are only a systematic effort to extort as much as possible out of the employers, irrespective of justice or any real need of such advances. Every concession which has been granted has only brought forward further applications. When it is remembered that all these extra expenses have to be met by the public (this being more or less common to all industries—and the gas workers themselves form part of the general public), it resolves itself into a recurring increase of wages and the cost of living; the one following the other without any material advantage to the wage-earner. We are suffering to-day from strong Government competition for labour; the unnecessary and absurd scale of wages paid in munitions and other like works only creating a feeling of unrest among the employees in private works, and having the effect of tempting men to leave our service. Employees, however, should not lose sight of the fact that the positions which they hold with us are permanent so long as they choose to do their work properly, and carry certain concessions which are of considerable value. I will refrain from making any further reference to this subject, for reasons of which no doubt you are all fully aware.

TAR AND SULPHATE.

The former residual has shown varying fluctuations throughout the year; but there is no great outstanding feature calling for any special comment. Many works in our district have been from time to time embarrassed with stocks of tar, principally caused through the shortage of tank-wagons; and as the Government have placed restrictions on the disposal of tar for road purposes, it has had the effect of stopping one of the principal outlets from many of the smaller works. The demand for sulphate of ammonia has been increasing steadily, and at the moment has reached such a degree that it is impossible to supply all the requests made for this fertilizer. In my own particular instance, the number of orders coming forward has been equal to at least three times the amount of salt usually disposed of by us. The shortage of other chemical fertilizers has no doubt created this tremendous boom in the sulphate business; and I trust that the results will prove so satisfactory that farmers will continue to send orders for this material when we again reach normal times.

COMMERCIAL SECTION.

The Commercial Section of the Association has held many successful meetings during the past year; the attendance at these meetings, judging from my own observation, having been higher on an average than in previous years. The many members who attend have, I am sure, never felt the advantages of the Commercial Section so much as they have done during the unsettled times we are now passing through. There are so many complex and interesting subjects continually being brought forward for discussion which cannot fail to result in some good, either to the individual manager or to sections of the industry. It is the desire of the Committee of the Commercial Section—which, I am sure, the members of the Southern District Association will appreciate—to greatly increase the usefulness of their meetings and, if possible, try to induce more members of the Southern District Association to attend. Might I impress on all members the advantage and help which the meetings give? They should be looked upon not only as a means of receiving information, but also as a means of imparting information and personal experiences. Any member who imagines that he need not attend these Commercial Meetings because he already knows all that he wants to know about any subject down on the agenda, should bear in mind that there are other engineers, possibly not so favourably placed, who will welcome information which he might be able to give. It is the object of the Association that all members with knowledge to impart should attend and give the benefit of their experience to their fellow members.

THE SLIDING-SCALE.

It is unnecessary for me to make any special remark on the question of the sliding-scale and its effect on companies who are working under this particular system. The principle of the sliding-scale was not laid out to meet the extraordinary conditions which now exist; and it is only common justice to the gas companies and their stockholders that relief should be granted in special cases. This matter is at present receiving attention; and I trust that some good may result from it.

IN CONCLUSION

I certainly trust that the year of my presidency will be marked by the signing of Peace. This would indeed be a "Red Letter" day for me.

Mr. WESTLAKE moved a vote of thanks to the President for the address, which had so well covered the topics that were at present uppermost in the minds of gas engineers.

Mr. SAMUEL GLOVER (St. Helens) seconded the motion, which was very heartily agreed to.

The President thanked the proposer and seconder and the members for their kind expressions of approval.

Coal in War Time.

There was a long, but exceptionally interesting, discussion (which was opened by Mr. H. O. Carr) on "Coal in War Time." It is reported below.

The Summer Meeting.

The President referred to the question of the arrangements for the summer meeting. He pointed to the uncertainties confronting the members, and suggested that the matter of making arrangements for the next meeting should be left in the hands of the Committee, the Secretary, and himself.

This was agreed to.

At the close of the business proceedings, the members had tea together in the library.

COAL AND THE WAR.

The Questions of Impurities in, and Supplies of, Coal.

At the Meeting of the Southern District Association of Gas Engineers and Managers on Thursday last—the President (Mr. W. B. Farquhar, of Ilford) in the chair—Mr. H. O. Carr (Wandsworth) opened a discussion on the subject of "Coal and the War." Before reading the notes which he had prepared for the purpose, he remarked that the question was one that very much required ventilating. He had obtained the permission of the President to use what title he liked; and, therefore, he desired to change the one appearing on the agenda, "Washing and Screening of Gas Coal," to "Coal and the War," because he thought a wider subject was involved than mere washing and screening. With regard to washing and screening, he was not very familiar with coals beyond those of the Durham variety. But he did know they had been of such a dirty and dusty character for the last two or three years that he was afraid, in their treatment, there would be much remaining on the top of the screen. The coal measures had been formed, and they had been forming, for a good many thousands of years. Why they should have altered so considerably in the last two or three years, he did not know. He rather thought it was the hand of man rather than the hand of Nature that had changed the character of the coals during that period. Mr. Carr then proceeded to read the following notes:

With the exception of a very small percentage of power derived from water wheels and windmills, the whole of the power, light, and heat used in this country is derived from our coal. To a considerable extent we also supply our Allies and our possessions with power, light, and heat from coal mined in this country. To a country at war, no greater suicidal policy could be adopted than to greatly depreciate the value of the coal by including in it a large percentage of dirt, which should have been excluded at the pits. Yet this is exactly what has been happening. Ever since the beginning of the war, dirt, in progressively larger percentages, has been included in the coal. In most cases this is still going on; but in some instances an improvement has set in, and that is chiefly in regard to Durham coals, but they still leave considerable room for improvement.

It is the margin of power of production which is needed for a nation at war to gain victory over an enemy. English coal can be chiefly responsible for this margin of power; and the sooner the coal supplies return to their former or pre-war state of cleanliness, so much the sooner shall we bring the war to a successful conclusion. We are glad therefore to know that the Controller of Coal Mines has taken the matter up vigorously with the mine-owners, the general managers of the collieries, and the miners' representatives in respect to the stone and dirt in the coal (to the extent of about 10 to 20 p.ct.) which is being sent to the public utility undertakings of the nation, with a view to the coal produced being as clean as possible. His action is one which will be thoroughly appreciated; and we wish every success will crown his efforts. But beyond public utility undertakings, all essential industries in war time should have the class of coal which best suits them, as clean as circumstances will allow, taking into consideration transport and labour. The strictest economy must, however, be practised in regard to the use of coal, to save transport and labour; and no coal but that which is of vital necessity should be consumed, in order that all essential industries in war time should have adequate supplies. Coal stocks have now to be accumulated in our industry for winter use. All coal used to support luxuries and for non-essential industries should be ruthlessly cut down.

A walk round the chief shopping centres of London and the shopping centres of the towns members supply with gas cannot fail to convince an observant person that there is ample room for economy in coal. Shop windows and interiors are lit up at unnecessary times, and with a blaze of light just before the official time for "blinds down," and continuing to use till closing time far more light than is necessary, and, in many instances, displaying goods, made in war time, which are quite unnecessary and are detrimental to the successful prosecution of the war—fitted dressing bags, jewellery, perfumes, fancy goods, and such like, which absorb coal, transport, and labour.

Members will no doubt have other suggestions which will effect a direct economy in coal. We can lay down three axioms in regard to coal supply. The first is that the most essential industry should have the most suitable coal procurable; the second is that the further the most essential industry is from the coal-fields so much the better should be the quality of the coal to save transport and labour; the third is that no essential industry can object to a relative reduction in its coal supplies providing there is a corresponding rise in the quality of the coal. The gas industry can confidently claim to be the most essential one to a country at war, although the coke-oven industry, at those works where the gas made is put to useful purposes and where the residuals are all recovered, is almost of equal importance to the gas industry in war time, and fortunately, being near the coal pits, uses inferior and smaller coal than that employed by gas-works generally, as transport is not a matter of great consequence. Those essential industries which only burn bituminous coal to develop heat cannot claim equal importance to the gas and coke-oven industries; but they are still of great importance, and need consideration.

Should anyone exhibit doubt as to the gas industry being the most important one to a country at war, he can be reminded of some of the essential matters derived from the distillation of coal at gas-works.

Gas.—For power, heat, and light for all essential industries, public institutions, domestic uses (including the homes of of war workers and working classes).

Coke.—As a substitute for coal in all instances. The uses to which it can be put are being ably demonstrated by the London Coke Committee and others.

Retort Carbon.—Used for electric dynamo and motor brushes and arc light carbons.

Ammonia.—This, as sulphate of ammonia, will be extensively used as the most valuable chemical manure, and will be largely responsible for the coming increase in food production. It is also considerably used for explosives.

Sulphur.—For sulphuric acid manufacture to make sulphate of ammonia. The acid is used largely in the manufacture of explosives and other essential manufactures.

Tar.—This is the most wonderful product known, and the commercial articles into which it enters are legion. Some of the principal are as follows:

Dyes of every known hue, and of which there are many hundreds, practically all of which Germany controlled before the war, and was able almost instantaneously to convert the dye-works into explosive factories.

Picric Acid.—For explosives (Lyddite).

Creosote Oil.—For fuel oil for the Navy and other purposes, for pickling timber, and as an agent for extracting crude benzol from gas to make explosives.

Carbolic Acid.—For antiseptics and disinfectants, now so necessary for hospitals and for sanitation, for carbolic and coal tar soaps.

Benzoic Acid.—Used for the manufacture of saccharine as a substitute for sugar.

Benzene.—The foundation for aniline dyes, and used largely for explosives.

Carbon Bisulphide.—For solvent for rubber—and rubber, I may remind you, is now very scarce in Germany, whereas it is abundant here, and the advantage should be maintained at all costs. It is also a solvent for fats, phosphorus, and sulphur.

Eosine.—For red ink.

Anthracene.—For dyes.

Anthracene Oil.—For printers' ink and for extracting crude benzols from coal gas for explosives.

Benzaldehyde.—Used in the manufacture of aeroplanes and for bitter almond oil flavouring.

Ammonium Carbonate.—For smelling salts and for household rock ammonia.

Sal Ammoniac.—Used for soldering and electrical purposes.

Pyrogallic Acid.—Employed in photography.

Ammonium Sulphocyanide.—For photography.

Asparin, Phenacetone, Antipyrene, and Sulphonal.—These are well-known drugs used to cure headaches, nervous disorders, and insomnia.

Naphthalene.—For dyes, explosives, and as an insecticide.

Dehydrated Tar.—For surfacing and waterproofing roads, saving dust, watering, and heavy repair expenses.

Pitch, and its many uses, including the manufacture of patent block fuel as a substitute for coal, also used for varnishes, roofing felt, &c.

Toluol, from which the famous explosive "T.N.T." is made.

Benzol.—This is extracted from both tar and coal gas. It is used for explosives, and is an excellent and more powerful substitute for petrol.

Although the gas industry is of such enormous importance, especially during war time, the percentage of coal carbonized annually is surprisingly small. It is only about 7 p.ct. of the total coal raised, or about 9 p.ct. of the home consumption. Is it not sensible, therefore, to demand that this surprisingly small percentage (considering it is of the highest importance to a country at war) should be of the very best quality for the purpose?

In regard to eliminating the terrible amount of dirt in the coal, much can be done to assist the Coal Controller by individual effort; and no doubt some improvement has taken place in the last few months in regard to the supplies of seaborne Durham

coals, due to the complaints which have been lodged with the collieries and its agents. The Company which I have the honour to serve have always made a practice of carefully analyzing each cargo of Durham coals received; and since the middle of last year a practice was started of acquainting the collieries or agents they deal with of the quality of coals received, and comparing the analyses with those of the first few months of 1914. I am glad to say that the system has met with a good measure of success, in regard to two varieties. Some have shown a slight improvement; others have got slightly worse. But on the whole there was a distinct improvement during the last six or seven months.

Of two cargoes delivered from one Durham colliery, one was nearly equal in quality to that of 1914, and the other was better than any delivered in 1914. This only goes to show that Durham coal can be cleansed, even in war time, if the trouble is only taken to do so. One colliery wrote to say that they were urgently in need of steamers to provide work for the pitmen. I could easily suggest useful work to engage the pitmen's attention.

The engineer of a large electric supply company in London told me this week that the average ash in the coal used in 1917 for his undertaking was 31·3 p.ct. In 1914, it was 12 p.ct.—a difference of over 19 p.ct. I know from experience that even gas coals in their present dirty state are very much to be preferred to bunker coals for our ships; and this has an important bearing upon the shipping question. Our ships always use gas coals for bunkers when obtainable.

Labour to Clean Coal.

It has been suggested that it is difficult to find adequate labour to clean the coal; but if an abnormal amount of dirt is contained in the coal used for home consumption, which is about 200 million tons a year, and we take a low estimate of 10 p.ct. extra dirt, it represents about 20 million tons of useless material having to be dealt with by labour. What does it amount to? The coal mines industry employs about a million hands; the railways employ about half-a-million; and if at a rough estimate we add about a million hands engaged as carters and labourers dealing with the goods transported, we get a grand total of about 2½ million hands. Considering coal is equal to 40 p.ct. of the goods dealt with, we at once get the figure of about a million hands engaged on coal handling. If, therefore, 10 p.ct. of their labour is wasted in handling useless material, it looks as though 100,000 hands could be spared; and considering only a few thousand need be employed to clean the coal properly, I cannot see how there should be any difficulty in providing the necessary labour to properly clean the coal. But what have we suffered? And what shall we continue to suffer till the remedies are fully applied? The coal-gas making plant is seriously impaired in capacity, and we suffer a double disadvantage by having to use inferior coke, containing double the usual percentage of ash, in the furnaces under the retorts; and thus being unable to generate sufficient heat to properly distil even the poor quality coal. To make inferior gas from coke and steam to supplement the coal gas, with the further disadvantage that the bad coke greatly diminishes the gas-making capacity of the "blue gas" plant beyond the decreased capacity due to the absence of imported "gas oil." A large increase in the amount of labour required; about double the amount of ash and clinker to deal with; and consequent additional labour and transport. Spontaneous combustion in the coal-stores, arising from the pyrites resident in the rubbish, has caused trouble and loss at a great many gas-works. These very pyrites, or "brasses," if separated at the pits, can be made of very valuable use for the manufacture of sulphuric acid for forming, with ammonia, chemical manures to assist the production of food, as has been shown in an admirable article by Mr. Parrish, of the South Metropolitan Gas Company, in a recent issue of the "Gas Journal." The inferior quality of gas and coke supplied has caused discontent to consumers, and must have had a marked decreased effect on the output of factories engaged on war contracts. Decreased quantities of residuals of all descriptions, and the consequent reduction of supplies of the residuals necessary to carry on the war to success. There are many other evils which we all know; but, summarized, they all have their effect on the balance-sheet—causing the consumer to suffer by greatly increasing his price of gas, and the shareholder to suffer also by reason of the decreased dividends and the consequently largely decreased value of his shares.

Rail Coals.

In the discussion to follow, as I am not well acquainted with rail coals, members will no doubt state their views as to the quality received. But of the small percentage received last year by the Wandsworth Gas Company, one consignment, stated to be unscreened gas coals, contained 44 p.ct. of ash and only 20 p.ct. of volatile matter.

House Coal.

On the other hand, one consignment of Yorkshire Silkstone coals, undoubtedly used also as house coal, contained as little as 2·8 p.ct. of ash and as much as 32·8 p.ct. of volatile matter. If such house coal was available for gas-works, and there was a sufficient quantity of it, those works whose arrangements are suitable to receive it would find all their troubles at an end. I do not see any reason why such a valuable coal in war time should be mostly wasted by being merely burned in household grates, and the very rich essential residuals pass away into the atmosphere by way of the chimney as smoke. In war time it is an unwarrantable waste. A large number of the varieties of the best house coal do not yield more than about 8000 to 9000 c.ft. of gas per ton. The gas evolved is, however, of a very high quality—somewhere about 16 to 17 candles; but it cannot be reduced in quality and extended in quantity without drawing in a large percentage of flue gases. But where a "blue-gas" plant is available an excellent mixture could be formed, as it will allow a large percentage of blue gas to be added to the rich coal gas. This is a strong point, and one which can be urged in the proper quarters. Moreover, the prices of house coal according to a recent schedule issued by the Controller, for 39s. 6d. a ton the very best selected house coal can be delivered into cellars in lots as little as 4 cwt.; and Silkstone at 37s. 6d. These prices are probably cheaper than some gas-works are paying for inferior coals in considerable quantities. Stove coal is 33s. 6d. Householders in war time should use gas and coke to economize coal. Necessary house coal should be of an inferior quality to that now generally used. Coke sales should be unrestricted in quantities, as gas undertakings must inevitably produce it in the course of the manufacture of gas.

Looking generally at the coal question as it affects the nation in war time, it will be useful to quote an extract from the introduction to the "Times Fuel Number," published eight months before the war began, and particularly applicable to the present time. It is as follows:

> Of all the aids that Nature has in the past bestowed upon Great Britain with exceptional favour, there is none that confers more distinctive benefit upon the nation than the gift of coal; and yet there is none that ignorance has more wantonly squandered. When legislation decreed, and circumstances decided, that Great Britain should accumulate riches by manufacturing rather than by agriture, it was quickly realized by men of understanding that there was a vital relationship between fuel and foodstuffs; and when, at a later stage, the country ceased to be self-supporting in food supplies, the grim facts of the case relating to fuel reserves awakened the Empire, and made the whole world think. With the development of steamships for the merchant service, and the simultaneous abandonment of wind-propelled vessels by all navies, it had to be admitted that fuel was essential alike for the transport of foodstuffs and for their protection in transit. A beginning was therefore made towards establishing principles for the distribution and use of fuel reserves, and there was an attempt to secure economical combustion. Meanwhile, the mills, factories, founderies, potteries, and homes in England and elsewhere were devouring the supplies of coal in inefficient stationary engines, wasteful furnaces, and smoking fireplaces; and there was no check upon the export of British coal to foreign ports.

If it is very generally admitted that the whole of the coal sent from the pits contains anything from 10 to 20 p.ct. of dirt, let us examine what this really means to a nation at war. The "Iron and Coal Trades Review" for Jan. 18 estimates from official figures that the coal output in 1917 was 250 million tons. This is a huge tonnage; and it must be remembered that there is no one class of material dealt with in this country which nearly approaches that of coal in tonnage. If the whole of the coal now contains 10 to 20 p.ct. of rubbish, we must estimate the extra amount of dirt in the coals compared to 1914. If this is taken at a modest 10 p.ct., we at once get the figure of 25 million tons of extra dirt annually in the coal. Truly an appalling figure! If we apply the 10 p.ct. to railway trucks for the nearly 200 million tons of home consumption in this country, we get the astonishing figure of 2 million ten-ton trucks full of dirt—more tonnage in dirt, in fact, than coal annually carbonized at all gas-works! What does it mean in ships?

Of our huge output, the "Iron and Coal Trade Reviews" estimates the total coal, coke, and patent fuel shipped abroad in 1917 at no less than 50,800,000 tons. The coke and patent fuel may be taken at 2,800,000 tons, and leaves therefore a net figure of 48 million tons of coal exported. But this does not include coal loaded in ships for the United Kingdom, which I estimate at about 7 million tons—making (say) 55 million tons shipped per annum. If we again apply the figure of 10 p.ct. extra dirt in the coal exported, we at once get a figure of over 5 million tons of shipping utterly wasted. The official figures for the building of merchant ships of 1500 tons gross and upwards from British yards in 1917, as stated by Sir Leo Money in the House of Commons recently, was an aggregate of 1,057,696 tons.

The "Times" of Feb. 21, reviewing Sir Leo Money's House of Commons statement of British vessels lost during 1917, says:

> Taking the two classes of ships together—*i.e.*, ships over 1600 tons and over and vessels under 1600 tons—and an average of 3250 tonnage basis, the approximate estimate of a loss of 3,500,000 tons during the year is probably under the mark.

If, therefore, we deduct the one set of figures from the other, we get the net loss of about 2,500,000 tons. The 5 million tons of wasted tonnage due to the extra dirt contained in the coals, appears to be equal to about two years' sinkings of British vessels by German submarines. If we clean the coals properly, we can put the Germans back to about the position they were in at the end of 1915. Is it not worth it?

The imports of grain, flour, rice, *plus* every kind of meat food, according to official blue-book figures for 1916, were slightly over 10¾ million tons. No one will deny that in 1916 the country was well fed. Let us say the staple food imports for 1917 were, at a very low estimate, 8 million tons. If the 5 million tons wasted through the extra dirt in the coals are added, we at once get 13 million tons of staple foodstuffs which could be imported if the coals were only cleaned as well as in 1914, or more food imported than in 1916. Yet Lord Rhondda in the House of Lords on Feb. 27 stated that "the only effective way to increase meat pro-

duction was to import cattle and foodstuffs; but this could not be done, because the ships were wanted for grain." I venture to suggest that, if the coals are properly cleaned, there would be more than sufficient tonnage both for meat and grain.

DISCUSSION.

The President remarked that Mr. Carr had given the members some valuable information; and he therefore hoped the discussion would be a good one.

The Result of an Experimental Investigation.

Mr. G. M. Gill (South Metropolitan Gas Company) said the matter dealt with by Mr. Carr was of most vital importance. They talked a great deal as to the amount of ash in coal; but, of course, it was quite impossible for the collieries to get out a large part of it. He had been interested in trying to find how much could be actually picked out. He had taken a large sample of about three tons from between thirty and forty cargoes during the last few months. He screened the coal through a ¾-in. square-mesh sieve, and hand-picked the rough; and this showed an amount of slates, stones, and useless matter of just over 4 p.ct. that could be picked out by hand, and which should have been picked out by the collieries, especially having regard to the great value of tonnage at the present time. To show what this meant in the case of an undertaking such as the South Metropolitan Gas Company, he might mention that during the last three months—December, January, and February—the Company had used 388,000 tons of coal; and the 4 p.ct. equalled 15,600 tons in the three months. Then, again, he took the actual cargoes that were brought to London by the Company's various vessels; and he calculated that, during the three months, it would need a 2000-ton collier simply doing nothing else than bringing this useless material to London. If this useless stuff in the Company's coal was taken out at the pit's mouth, it would mean the services of another collier available for carrying good coal to London; and be it remembered this was only one case. Another point was with regard to the furnace ashes from the coke and breeze used in the Company's works. In their case the fuel burnt amounted to something like 4 cwt. per ton of coal carbonized. This was the coke and breeze burned in the furnaces of the retort and boiler houses. In 1912, the amount of useless material that was sent away from one of the largest works after the refuse from the furnaces had been thoroughly picked over was 5174 tons. This had now increased to 13,837 tons. This was considerably more than twice as much; and he thought it came from what he had said as to the dirty state of the coal. One other matter in connection with coal. He knew that some gas undertakings had had a good deal of trouble with firing. When he went to the South Metropolitan Gas Company, he found an excellent system in use there, which really quite prevented any firing. The coal was stacked in the open in large heaps, not higher than 15 ft. deep; and a good supply of river water was laid on over the whole of each heap. Then ⅜-in. rods were driven down into the coal at various points. These were pulled up every day; and if they were hot to the hand, a copious supply of water was turned on to the heated portion, and left on for twenty-four hours or longer. In the case of inside stores, the coal was stacked to a greater depth than 15 feet, and the same method was followed; and it merely involved more care and more water when any heating was experienced. In this way, there was no trouble whatever; and they had not lost any coal from heating. The question of the useless matter in coal was of vital importance, and one which should be vigorously taken up.

Agitation and an Improvement—Effect of Increased Ash on Coke.

Mr. A. E. Broadberry (Tottenham) said he had taken a great deal of care to ensure that the coal he received was kept as clean as possible—that was, up to the best standard. He found that, by continual agitation, it was possible to induce the collieries to improve their methods. So far as their figures showed, the worst year for bad quality coal was 1916. Since then the pressure that many of them had brought to bear on their coal merchants and collieries had had a good effect; and they were now endeavouring to improve the state of the coal. He thought that everyone must realize the utter wastefulness of carrying this inert mass of tonnage. But it did not end there. The coke that was produced, of course, contained all the ash that existed in the coal; and the increased percentage of ash in the coke became far greater than the percentage of ash in the coal, because if the coal contained 20 p ct. of ash necessarily the coke must contain 30 p.ct. When they considered the use of coke containing 30 p.ct. of ash, they could see the difficulty into which this plunged every industry that depended on coke for firing. They found the difficulty in their own furnaces. The clinker reduced the efficiency of the fires, and spoilt the carbonizing results. There had been much extra clinker to take away. This involved additional labour in cleaning the fires; and in every way troubles multiplied more than the excess of ash originally contained in the coal. He thought all of them should do whatever they could in the way of agitation to compel an improvement in the coal. The way in which coal had deteriorated in the matter of the dirt and impurities delivered the last two or three years was really a national calamity.

Gas Coal and Household Fires.

Mr. S. O. Stephenson (Worthing) said he thoroughly agreed that the cleaning of coal was a most important subject; but there was one of equal importance at the present time—that was what he called the scandal of house coal. In his opinion, the Coal Controller had played into the hands of the local coal merchants, and so had assisted in their profiteering. The system he believed the Controller had for dealing with house coal supply was to ask the Local Coal Committees of the different towns to send in requisitions as to the coal that was wanted to keep the house coal going. How were these Local Coal Committees constituted? In practically every case, they consisted of members of town councils, who were out for votes, and were not going to lose them, and local coal merchants, who were out for profits, and meant to have them. The requisitions were sent in, and were passed; and gas undertakings had to suffer in consequence. In order to increase the mad household coal scheme, the Coal Controller's Department set to work to divert gas coal for house purposes. He knew this to be so, for he had seen it done in Worthing. He had found beautiful gas coal put on to the sidings for house purposes, while he and others had been starving for it. If they went to the Coal Controller's office and complained, someone there would tell them to buy spot lots. Then on going into the market, they had foisted upon them stuff from some outcrop from (say) Derbyshire, which contained neither gas nor volatile matter, nor anything else useful to gas-works, while good gas coal was going into domestic grates. Appeals to the Coal Controller up to the present had not been sympathetically received. The great idea of the Department seemed to be: "Keep the home fires burning." [Laughter.] If there was a shortage of coal, one of the very first directions in which supplies should be cut down was household coal, and not gas coal. The coal carbonized in gas-works was being utilized to national advantage in these times when things were exceedingly serious; the coal used in house grates was, so far as national affairs were concerned, being largely wasted. During the past year, there had been more coal set aside for household purposes than since the war started. Gas-works, as Mr. Carr mentioned, only used 7 p.ct. of the coal consumed in the country; and before this 7 p.ct. was curtailed, those responsible should tackle the much larger quantity of coal used for household purposes, which was a source of waste. He must admit he had been very much assisted by the Town Council; and the local merchants had been reasonable since he went into the matter, and wrote a hot letter. Week by week now he was receiving wagons of good gas coal, which they had transferred over to him. This diversion of gas coal to domestic purposes was the sort of thing that ought not to be going on. He did not know where some of the men came from who were at the Coal Controller's office; but they did not seem to have much knowledge of the work they were dealing with. The multiplicity of Government Departments created during the war were simply producing muddle all round. He did not want the remarks he had made with regard to the Coal Controller's Department to be misunderstood for one minute. He knew their good friend Mr. Thomas Glover had not let them down. He had strong reasons for knowing better than that. The Coal Controller himself was a man of the highest integrity; but it was at some of the officials Mr. Calthrop had around him at whom he (Mr. Stephenson) was hitting, and who did not know their work. Mr. Glover was assisting the industry to the utmost of his power. There had been no want of effort on his part; and possibly he had cause for complaint that gas engineers had not backed him up to a greater extent. As an industry, they were not so alive as they might be. Their Associations and Institutions had a lot to pick up in this way. If he might make an exception, it would be the British Commercial Gas Association, which had shown more liveliness than any other of their organizations. As an important industry, he did not think they got the recognition they ought to have. In Government Departments, they were looked upon with almost feelings of hostility, and some contempt. He should like to see their Institutions and Associations more alive than they were. They elected on to the various Councils too many benevolent and kindred gentlemen, who wanted to be left alone, and to leave others alone. A little more life would be very acceptable. He hoped that a very strong protest would go forward to the Coal Controller, and that they would ask for recognition of the beneficial work they were doing, and that their coal supplies should not be cut down before those for non-essential trades and household purposes.

The President remarked that the last speaker had departed somewhat from the real subject under discussion, although the matter he had brought forward was just as vital as the subject of inert matter in coal. Still it was the inert matter in coal which they were considering on this occasion; and therefore he would ask speakers to devote themselves to this particular question.

Mr. Stephenson remarked that it was at the request of Mr. Carr that he spoke; and it would have been noticed that he had changed the title of his paper.

More Confirmation—Inerts and Labour.

Mr. W. N. Westlake (Exeter) said he thought the best attitude that could be adopted was to express their sincere hope that the effort the Coal Controller was now making to get the coal owners and the miners to co-operate to reduce the inert matter in coal would be successful, and that in the near future the coal which was being distributed all over the country might come back to something near the quality which they were in the habit of receiving years ago. He thought the Coal Controller would appreciate an attitude of this kind. They could also assure him that they would be delighted to do anything possible to help him in this matter. He (Mr. Westlake) also thought they should press upon him the national importance of this question as illustrated by Mr. Carr in his communication. The gas industry as a whole was not a profiteering industry, or even approaching it. They were struggling now to keep the industry going for the benefit of the consumers and the war; and they appealed to the coal owners and miners, through the Coal Controller, to help them in this great difficulty—to help them for the grave reasons Mr. Carr had put before them. With regard to the increase of inerts in coal, in a small way his experience coincided with that of Mr. Carr—that was to say, in some cases the quantity of inerts had been augmented. One coal used to average something like 4 p.ct. of ash before the war; it was coming in now with about 16 p.ct. of ash in it. There was another coal which before the war contained between 7 and 8 p.ct.; it was now coming in with about 18 p.ct. This was a serious increase. He thought its seriousness was enhanced when one found there were collieries which had even reduced the ash content. If some collieries could do this, others could. Certain of the coals showed an ash content that was actually down—small reductions, true, but still reductions. But, taking the average over the whole, there was a considerable increase in inert matter. It was a question they should press home with all the power they could command to get this remedied at the earliest possible moment. One other question had been touched upon—that of labour in gas-works. The point must not be forgotten that, if they could get the coal sent in of a quality approaching what it was in pre-war times, they would not have to ask the Ministry of Munitions for more men to turn out the same amount of gas. This would be a considerable help to the country. Next winter the labour difficulty would be worse than during the one

from which they were now emerging. He hoped that this meeting would have the effect of helping to promote a better condition of things in the direction they had in view.

CAUSES OF IMPURITIES IN COAL—GRADING AND WASHING.

Mr. THOMAS GLOVER (Technical Adviser for the Gas Industry to the Coal Controller) said he had no objection whatever to the paper that had been read, nor to the remarks of Mr. Stephenson or of anyone else drawing attention to the important matter of the useless material delivered in gas coal, and the evil effects of it. In fact, he welcomed all such action. Mr. Carr had been very insistent and persistent; and he had helped in bringing about the action which had been taken, and more action would be taken if what had been done did not bear sufficient fruit. He also welcomed what Mr. Stephenson had done in his letters published in the Technical Press; regarding them as able letters upon a very important matter. He thought he could already assure Mr. Stephenson and those who thought with him that the matter of household coal supplies was going to be checked and restricted with the view to coke stocks being reduced. This had been taken in hand by a strong Committee only that morning, after many weeks of insistence on his part that this very important matter should not be further neglected. Thus the two serious matters which concerned the members, he could say, were being dealt with; and he therefore hoped that they would feel relieved to some extent. With regard to impurities in coal, he had been obtaining information for the Controller, and getting it focussed and concentrated in a report; but it was not quite so easy to procure the information as might be thought. Mr. Moon's presence reminded him (Mr. Glover) that he was willing to help, and did help, by sending him quite a lot of tests of Somerset and other coal. But, unfortunately, he had nothing with which to compare in pre-war times. These tests taken recently showed excessive quantities of ash; and so far as they went, they told their tale. To anyone who knew anything at all about fuel, it was a sufficient tale. But what was asked of him (Mr. Glover) was to get comparative data as to particular coals tested before the war, or before the period of degradation, and since; and the result was it was only possible to secure tests from few sources. What was a more astonishing thing was that these did not show anything like the increase alleged, except in one or two cases. The increase was less than he had made up his mind that it would be; but there was an explanation for this. The coal from the standard seams had not increased in impurity to anything like the extent that had been said. But a great many of the seams were being worked to-day, and it was worth the collieries while to work them under present conditions of no competition, &c.; and these second-rate and third-rate seams did show a serious percentage of ash. The percentage of impurity in coal also varied very much with different districts; the Somersetshire field being about the worst. Why? Because the seams were so thin; and probably the labour employed on these seams was not so efficient, nor probably was the picking, if there was any picking done. It was all sold as through coal; and it was difficult to clean compared with screened coal. The labour given to the picking was *non est*, or was whittled down to very little. The miners in some districts refused to allow women to work at the picking-belts—a practice common in Lancashire. He could show them pictures of women in Lancashire working at the picking-belts; and they did their work as well as any men. Now during the period through which they had been passing (and the conditions had been bad), there were two coal-getting shifts in the day—half-past six to half-past two, and half-past two to ten o'clock. And soon after three o'clock in the afternoon, working under cover in the sheds where the picking-belts were, they had to work with artificial light often of very poor quality. If any one of the members or himself was working at the picking-belts from half-past two to (say) eight o'clock, he thought that the member or himself would be by that time getting very tired, and, under the poor light, would be missing a good many pieces of bats and pyrites. It was then that there was not the vigilance or the zest put into the work as was the case in normal times. To show that he had no resentment of any criticism made regarding the Coal Controller's Department, he might say that he suggested that the paper by Mr. Carr should be read; and he thought it was very important not only for the war period, but for the period after the war, that they should get the coal industry (as far as they could influence it) on to a better and sounder foundation. There was a method of cleaning coal which was practically automatic—by sizing, grading, or washing. Those who had experience of washed coal would find their impurities had gone up very little indeed, because the washer worked automatically. The only time the washer would not do as it was expected to do was when the coalowner had some sort of misgivings as to the great heap of dirt that had been washed out of the coal, and then decided not to change the water, but to wash the coal in mud. He was looking at some samples of washed coal the other day which indicated that the water was not quite so clean as it might have been. He had been in collieries at which there was ideal washing plant; and he had been asked by the colliery owner, "What about that heap of dirt there, which has been washed out; I have not been paid for that." Users of coal could afford to pay a higher price for a pure coal; it paid to give a higher price for a pure article. Now he was coming to another point which he wanted to bring before the members. Durham coals were sent away for the most part as they were wrought out of the pit into boat by the nearest possible road, and without practically any preparation, or attempt at grading, removing the dust, or washing. But they had some seams in Durham which had undue quantities of sulphur in them. If sulphur was in the form of pyrites, it could be removed. But there were cases, such as Mr. Gill had referred to, where they could not get the dirt out of the coal. It was in the coal substance; and they could not by any system of screening, grading, or washing make it into a perfect coal. There were coals that it was said were not fit for gas making. He knew several of them, and had had experience that they could be made most useful coals for gas making by the system of grading and washing. They knew the coals in Durham that were very sulphury; and he thought that these coals would be very much improved by taking the dust out of them, then grading them, and, if possible, washing them. By washing, he believed there would be a tremendous improvement in certain of the coals, if the Durham coalowners could only be induced to take out the dust. The dust could be used for coking in the coke-ovens at the pits. The coals could be sized into pea-nuts, double nuts, treble nuts, cobbles, and larger size. The latter sizes they did not particularly want. If the coals after this sizing were still impure, then they could insist on better washing. Any washing process would remove the little bits of bats and pyrites which it was impossible to remove by hand. The system of washing was done by gravity. With the smaller sizes of coal, felspar was used, and, with the reciprocating pumping action that was given to the vessels containing the coal, the heavy stuff sank down through the felspar, and was removed by a stream of water—the coal overflowing, and passing to the bunkers to be drained. Another point had come under his notice very much in connection with his work for the Coal Controller. One works in the North of England, that were using continuous vertical retorts, were switched-off from Yorkshire nut coal to Durham unscreened coal; and of course, at once it was found that the speed at which gas making operations went on was very much retarded. When he was afterwards able to find them some Durham nuts—only about two Durham collieries produced nuts—gas making was accelerated. It made a distinct difference whether the coal was nut coal or the unscreened dusty stuff with which gas-works were familiar in the South. It was quite clear the conduction of heat into the charge was much slower when the coal was of a dusty nature than when it was of a nutty nature. It had also been found in steaming charges in vertical retorts that the steaming process could be carried on much more effectively when the coal was nutty rather than unscreened. He had been doing his best to help the gas industry in this direction, and was going to persist in doing his best. He wanted gas engineers to help him. Only recently he wrote to one of the leading men in the gas industry in the Metropolis, and asked him to interest the large buyers of Durham coal to see if something could not be done as to the removal of the dust, and the retention of this small stuff for coking purposes, either after washing or mixing with ground-up coal—disintegrated coal of larger size—in order to improve the average quality. If the larger coal was mixed with the dust in proper proportion, a sufficiently good coke would be produced. He was afraid his friend to whom he wrote thought he (Mr. Glover) was going to interfere with the supply of coal to the London Gas Companies. Of course, he was not contemplating anything of the kind. If the big buyers of coal in London and the South would begin to ask for graded coal, instead of the dusty stuff they had been buying, they would be making an advance for the gas industry in the South. He had no interest whatever in this matter, except as a gas man looking to the future. But such action, he thought, might pave the way to the more satisfactory introduction of what he was sure had to come—the continuously worked vertical retort. The progress of the continuous vertical retort would be much slower in the South than it had been in the Midlands and the North, unless they got coal that would match the retorts. It might be said: "Let us have the retorts to match the coal." But why not improve the coal to match the most perfect ideal of what a retort should be? Tied up to the old horizontal retort, they had the black dust associated with the discharge of the coal from the boats on the Thames into the works; and there were the fires attached to the stacking of the coal, and the other disadvantages of working with dusty coal. Improvement was very largely in their hands, by insisting on getting the quality of coal they wanted. He had told them now all he had for some time been thinking about and working for. In the Scottish coalfields, the collieries were of comparatively small size, and their output of coal was small. But they had a co-operative washery; and the smalls from a group of pits in all directions were sent to the co-operative washery, and were dealt with there. The Fife coalowners had in normal times made quite a new market for their beautifully washed and graded coal. Very large quantities were sent for steam-raising to the South of England, and very considerable quantities to the Continent, where they appreciated washed coal. In Belgium, France, and Germany almost the whole of the coal was graded and washed. Let this country not be behind. He felt the method of dealing with the coal in the Durham district was primitive. It was perhaps the easiest way; it was not the satisfactory way, if they were to make progress on right lines.

Mr. C. S. SHAPLEY (Southend-on-Sea) said he thought Mr. Glover hit the nail on the head when he talked of coal washing, because the collieries themselves gave them the lead in this direction in the coal they used. Any up to-date colliery with a coke-oven plant had a washery attached to it. He thought gas engineers must in future give more attention to the quality and sorting of the coal they bought. But one was forced to further action; and he suggested that their action should be of a collective character. He proposed a resolution to this effect.

Mr. W. R. PHILLIPS (Luton) seconded.

Mr. D. T. LIVESEY (East Grinstead) suggested a modification, which was adopted. Eventually, the resolution was passed in this form:

> That the members of the Southern District Association present in general meeting, on the 7th of March, learn with great satisfaction that the Coal Controller is taking action in the matter of the excess of inert material in the coal now being supplied for gas-works purposes, and would assure him of any assistance the gas industry can render. They would submit that supplies of coal for gas making should be given priority over those for direct household use.

The PRESIDENT, in closing the discussion, said there was nothing he could usefully add to Mr. Carr's paper. He had a number of figures showing the percentages of ash in coal varying from 10 p.ct. to 30·8 p.ct. Anything further that he could add would merely confirm what had already been said. Of course, a small company working in tens of tons did not show the real state of affairs; but when they came to big companies like the South Metropolitan Company, who were able to put forward the figure of 4 p.ct. of inert as representing in their case upwards of 15,000 tons of waste in three months [see Mr. Gill's remarks], they had convincing figures. Mr. Broadberry had pointed to an important matter when he referred to the injury inert material in coal had upon the coke, and to the resulting effect in the shape of clinker in the retort furnaces, boiler furnaces, and water-gas producers. All this trouble came from the inert material in the coal.

On the motion of the PRESIDENT, seconded by Mr. S. O. STEPHENSON, a hearty vote of thanks was passed to Mr. Carr.

Mr. CARR, in thanking the members, said he appreciated very much the excellent discussion that had taken place. The views of the members would no doubt reach certain quarters, and so would do a great deal of good. Since his notes were written, it would have been seen from the Technical Press that the Coal Controller had taken action. This, of course, was a happy move. Some of them perhaps thought the move might have been made long ago; but in these very big Government Departments sometimes things necessarily had to move slowly. They had to feel their way, and take at the proper moment measures which would be effective. By Mr. Glover's aid, there was no doubt they would obtain the greatest assistance from the Coal Controller's Department; and he thought from what they had heard that something was at last going to be done in this connection.

Mr. F. W. CROSS (Lea Bridge) thought that something had been left out of the resolution. They had had a lead from Mr. Glover as to what could be done in the way of cleaning coal, and by grading it. He considered that the resolution should not go forward without putting in a suggestion that the matter of grading should also receive attention.

The PRESIDENT said a Committee were at present considering the question of the cleaning of coal; and a very strong protest as to the dirty state of coal had been made at that meeting. In his opinion, the resolution should be in the most general terms. The Coal Controller had his experts to advise him on such matters as that referred to by Mr. Cross.

MODERN DEVELOPMENTS IN GAS-WORKS CONSTRUCTION AND PRACTICE.

By ALWYNE MEADE, Assoc.M.Inst.C.E.

[Abstract of a Paper presented to the Institution of Civil Engineers, March 5.]

After remarking upon the fact that, although the science of gas making has progressed by leaps and bounds, many of the older principles have survived, with but slight modification, to the present time, the author proceeded to compare gas engineering of the present day with the practice of the latter half of the nineteenth century—dealing with the calorific standard, the repeal of the sulphur clauses, and the sliding-scale. In connection with the last named, he drew attention to the fact that gas companies, while patriotically shouldering the burden of supplying the essential ingredients for the manufacture of modern explosives, have probably felt the effects of the war from a monetary point of view to a greater extent than any other of the country's staple industries, with the result that all working expenses have increased to unparalleled figures—largely owing to the increased cost of coal, labour, and transport.

After a lapse of seventeen years since the President (Mr. H. E. Jones) read a paper in which he referred to the sliding-scale, the cost of gas into the holder—that is, neglecting the heavy charges for distribution—has decreased by only 2½d. per 1000 c.ft., in spite of remarkable economies effected in methods of manufacture, and the lavish introduction of labour-saving appliances. The comparison, however, scarcely indicates the true state of affairs, and the increased burden due to the war.

Coal gas just before the outbreak of hostilities was being manufactured in particular cases for 6d. per 1000 c.ft. into the holder; and the promise of the future is reflected in the fact that at that time gas engineers with an eye to still more effective methods were speaking of the possibility of obtaining their gas into the holder at a profit. The future, however, held other things in store; and the dream of the economist seems likely to remain unfulfilled. Carburetted water gas has meanwhile suffered even more than has coal gas.

When consideration is given to figures which reflect the hardships of the large gas-making undertakings at the present time, it will be appreciated that there is every ground for a demand for relief from the statutory requirements which to-day are binding the industry. Little surprise will be expressed, therefore, at the decision of the leading gas undertakings to seek in concert some relief from the operation of the sliding-scale. The reduction in dividends disbursed by the gas companies during the period of the war is largely attributable to the sliding-scale provisions, with the result that the value of gas companies stocks has depreciated to an extent wholly out of keeping with the security offered.

One of the features of later gas-works policy has been the acquisition of fleets of colliers for bringing coal from the northern coalfields. This practice was instituted by the Commercial Gas Company, for whom, nearly forty years ago, special ships were built, though for some years these ships remained under charter. Early in the present century, however, the Company became direct owners; and since then many new vessels have been added to their fleet, while other gas undertakings have since adopted a similar course.

Some remarks followed on capital expenditure, in the course of which the author pointed out that, whereas twenty years ago the works usually cost more than the distributing plant, the reverse is now invariably the case. Capital expenditure per 1000 c.ft. is, he said, usually the *crux* of a gas undertaking's condition; and in any well-managed concern this item should undergo reduction as years go on, as a result of the taking up of new business and the extension of plant from revenue. Figures cited as illustrative of the three great Metropolitan companies showed that, while in 1906 the capital expenditure per 1000 c.ft. was 11s. 2d., in 1916 it had been reduced to 10s. 0½d. per 1000 c.ft. of gas sold.

The remainder of the paper was largely devoted to a description of the modern methods of construction and handling employed in gas-works and of the latest forms of plant used. Mr. Meade stated that the mechanical handling of material in gas-works has undergone considerable extension during recent years; so that now even establishments of a comparatively small order can instal certain types of labour-saving machinery to advantage. The result is that, whereas twenty years ago about twenty men were required in the retort-house for the production of each million c.ft. of gas per diem, to-day in large installations of vertical retorts the total number is only four. Speaking generally, it may be assumed that the saving of a single man's wages warrants at the present time a capital outlay of £600 to £800 on machinery. To illustrate the economy to be effected by mechanical appliances, consideration may be given to the case of a moderate-sized works producing about 2 million c.ft. of gas per diem, for which complete mechanical plant would now cost about £10,000. Allowing 5 p.ct. interest on capital expenditure, 3 to 4 p.ct. for maintenance, and 7½ p.ct. for depreciation—*i.e.*, a total of 16 p.ct.—it will be seen that an annual saving of at least £1600 must be effected. In other words, as a gas-works of this size would carbonize about 40,000 tons of coal per annum, a saving of 10d. per ton is necessary to meet the capital expenditure, &c., before any profit from the mechanical system is shown; whereas a complete installation of this description would probably result in saving at least sixteen men, whose wages would, at present rates, account for an outlay of approximately 15d. per ton of coal handled.

An indication was given of the purposes for which labour-saving machinery is now employed in gas-works—showing that the handling machinery introduced is almost solely in connection with the retort-house, although on the larger works mechanical means of dealing with other raw materials or bye-products—such as oxide of iron and sulphate of ammonia—are frequently provided. As to grabs for coal unloading, it was remarked that a great advantage attached to the use of the self-acting grab is that its capacity for a given weight is much greater than the capacity of some of the more common forms. For instance, a Barnard grab having a capacity of 1 ton of coal weighs approximately 1 ton; while many of the older grabs of similar capacity weigh as much as 28 cwt. When this factor is considered in relation to the safe load of the crane, it will be seen that, with the new type of grab, considerably more coal can be dealt with in a given time; or, in other words, a ship of given capacity can be discharged in less time. This fact is of supreme importance at the present day, when so much depends upon a quick discharge. At what is probably the largest jetty attached to a gas-works in London, the time of discharge has been reduced by one-third by the substitution of Barnard grabs for those of an older pattern. With the self-acting grab, moreover, wear and tear is reduced, owing to the elimination of shock due to a high discharge; while the dust difficulty is more or less surmounted. Modern practice inclines towards the substitution of wire ropes for crane chains.

Trucking has been largely superseded by mechanical coal conveyors—particularly telphers. The works of which the author is in charge offer a typical illustration of the economy to be effected by introducing methods of this kind. The whole of the coal discharged, amounting to some 90,000 tons per annum, is taken direct from the jetty to the retort-houses, a distance of 300 ft., by a 30-in. leather-band conveyor travelling at a speed of 300 ft. per minute, and driven by a gas-engine of 36 B.H.P. The coal is automatically weighed *en route*. The saving effected per annum by this arrangement will be apparent from the fact that before its installation the cost of discharging ships and trucking to the desired spot was 9d. per ton of coal dealt with. The work is now done for 4½d. per ton, which includes a liberal allowance for wear and tear of the mechanical plant. The modern tendency is towards the use of electrically-operated mechanical plant in gas-works; and the reason for this is probably that there is no more economical or convenient power than electricity generated at a gas-works, for the gas does not have to bear the heavy cost of distribution, &c. This is the reason why the electric telpher has attracted the attention of the gas engineer.

Wear and tear is greatly diminished with electric telphers, as the only part of the apparatus in contact with the heated coke is the skip which (with minor repairs) should last for a number of years.

The next section was devoted to hot-coke conveyors, which were classified; particulars being given of the draw-bar pattern originated by the late M. De Brouwer, and the Drake tray conveyor. As an example of the saving which mechanical means of handling coke may effect, it was mentioned that at a works producing approximately 30,000 tons of coke per annum, the old system of fire-raking and double handling involves an expenditure of 15d. per ton of coke dealt with, whereas with mechanical plant, after providing for wear and tear, the cost would be 5½d. per ton.

Considering the different systems of carbonization, the author expressed the opinion that the inclined retort can scarcely be said to have met with the success which was expected from it; the chief disappointment being the inability of the coke charge to run automatically from the retort when the door at the lower end is opened. Moreover, there is a tendency for some types of coal to "creep," and thus leave the upper portions of the retort empty,

while the lower portions become choked. The horizontal system, with all its contributory improvements—such as extremely efficient regeneration—is still by far the most popular means of carbonization; and many engineers are of the opinion that, so far as working results are compared, it possesses decided advantages over the vertical type. Though the costs of operation of vertical retorts are one-half to one-third of those of horizontal types, the capital expenditure they entail per unit of coal carbonized is in comparison very much heavier. A great drawback to the horizontal retort is, of course, the fact that a considerable loss of sensible heat takes place when the incandescent coke is discharged from the retort. In this respect the designer of vertical retorts has been able to effect still further economies in fuel consumption by employing the heat of the coke before it is discharged for raising the temperature of the primary and secondary air admitted to the producer. The manner in which effective heat-exchange has reflected upon the fuel consumed for heating the retorts was illustrated by the following figures:

	Original Weight of Coal Carbonized Employed as Fuel.
Direct-fired furnace (old-fashioned)	28 p.ct.
Generator furnace	15 to 18 ,,
Regenerator furnace (modern)	11 to 14 ,,
Vertical retorts—	
Intermittent types	16 ,,
Continuous types	11½ ,,

It is a fact of some significance that practically no change has taken place for many years in the size of the horizontal retort, though a radical alteration was effected about twelve years ago, when mass carbonization (obtained by completely filling the retorts) was universally adopted in lieu of layer carbonization. Many benefits resulted from this change; the most conspicuous being the great reduction effected in the production of naphthalene, the comparative immunity from stopped ascension-pipes, and considerably less degradation of the valuable hydrocarbons. Mass carbonization prompted the idea of employing retorts of much greater capacity, approaching the lines of the chambers found in coke-oven establishments. Mr. Thomas Glover erected at Norwich a series of retorts 21 ft. long, 3 ft. high, and 1 ft. wide. The average coal charge per retort amounted to 21 cwt. Experience, however, showed that heavily-charged retorts of the normal size gave equally satisfactory yields; and Mr. Glover ultimately abandoned the system. The author corroborated this view from experience gained from a series of abnormal retorts, oval in section and measuring 22 in. by 18 in., which have been under his control for the past two years. In this case, the maximum coal charge is 16 cwt.; but, in spite of this fact, the production of gas per retort per diem is less than with retorts of normal size.

After an illustrated allusion to discharger-charger stoking machines, reference was made to machines for the augering of ascension-pipes, the clinkering of producers, and the poking-down of fuel into furnaces—the two last-named appliances being due to Mr. G. M. Gill. Proceeding, Mr. Meade remarked that about six months ago, he introduced at the Wapping works of the Commercial Gas Company the "pressure grille grate," which has practically done away with clinkering in the ordinary sense of the word. This grate consists of specially-designed cross bars and hanger bars, arranged in the form of a grille, so as to yield a maximum of grate-area. The whole is built up in cast iron; and the primary air for the producer is injected by means of an extremely small jet of steam, which assists in cooling the fire-bars and in preventing the formation of clinker. It seemed probable at the outset that the entire use of cast iron might not be practicable; but after eight months' continual use, no burning or deterioration of the metal is noticeable. A very appreciable saving has followed the elimination of mild-steel fire-bars and false-bars, which at the present time are by no means easy to obtain. The saving in fuel, moreover, has been remarkable; producers fitted with the grille grate consuming only two-thirds of the quantity required in the ordinary furnace.

The author explained the continuous and intermittent types of vertical retorts, and went on to say that an increase in the yield of gas per ton of coal, as compared with that given by horizontals, has often been claimed for vertical retorts. When considering straight coal gas, however, this point is open to doubt; and it would seem that the most up-to-date horizontal benches, carefully supervised and regulated, hold the advantage. When "steaming" of the charge in vertical retorts is practised, it is, of course, possible to obtain some considerable increase in the yield of gas per ton of coal.

The characteristics and methods of working of vertical retorts were made clear by descriptions and diagrams of the Woodall-Duckham, Glover-West, "Intermittent," and "Glasgow" [Alexander Wison] systems; the salient features of horizontal retorts and modern vertical systems being shown by a table. The last line of this table read: Working costs per ton of coal per maximum day: Horizontal retorts, 1s. to 1s. 6d.; Woodall-Duckham verticals, 7½d.; Glover-West verticals, 5d. to 7d.; Glasgow verticals, 4d.; and "Intermittent" verticals, 4d. to 6d. The results secured by Mr. J. E. Blundell, of the Macclesfield Gas-Works, in "steaming" with vertical retorts were quoted, along with figures relating to the carbonization of Yorkshire coal, and of a mixture of Yorkshire, Derbyshire, and Staffordshire coals—the first of the ordinary method and the second with "steaming." These showed that, whereas a ton of coal under ordinary conditions yielded 6,385,970 B.Th.U. in the gaseous form, with the new conditions the yield amounted to nearly 8 million B.Th.U., or an increase of 24 p.ct. In view of the water gas produced it is, Mr. Meade remarked, surprising to find that the coke yielded underwent a reduction of only 2 p.ct.; while the extent to which degradation was avoided was well illustrated by the increase which occurred in the tar and ammonia. There can, he added, be no question that this new method of operating retorts has been rendered practicable by the current official attitude towards illuminating power; and it is an additional item that must be placed to the credit of verticals. The horizontal retort, unfortunately, does not lend itself to the application of the same process.

The final section of the paper dealt with the recovery of benzol and toluol, the effect of which on the essential calorific value is, the author quoted the following figures given by one authority, to show, almost negligible, while the flame temperature is actually increased.

EFFECT OF EXTRACTION ON CALORIFIC VALUE.

Quantity of Crude Benzol Extracted.	Loss in Calorific Value.
2·1 gallons per ton of coal	4·5 p.ct.
2·5 ,, ,, ,,	7·0 ,,
3·0 ,, ,, ,,	8·0 ,,

Thus, with what amounts to almost complete extraction, a normal gas of 550 B.Th.U. per cubic foot will, after treatment, still possess a calorific value of over 500 B.Th.U.

To-day, said the author in closing, the one regrettable fact of the whole situation is that, of the 280 million tons of coal mined annually in this country in normal times, only about 30 million tons are treated for the recovery of bye-products. When, moreover, the fact is realized that the coal reserves of this country are trifling compared with those of America and the Central Empires, it will be evident that there is no time to be lost in developing to the utmost advantage the natural gift upon which pre-eminence as a nation depends.

A NEW PRINCIPLE IN GAS-HEATING APPARATUS.

In discussing in the columns of the "Journal of the Franklin Institute" the transmission of heat from the flame to the contents of a saucepan, kettle, or boiler, Mr. Carl Hering contends that the common methods of heating such vessels are very inefficient, because the sudden chilling of the high-temperature flame, by playing on a surface of much lower temperature, leads to the formation of a film, very thin but of extremely high thermal resistance, through which the whole of the heat that is usefully conveyed to the contents of the vessel must pass.

After quoting several experiments illustrating the properties of the film, he arrives at the conclusion that the greatest heat flow is obtained when the drop in temperature caused by an artificial resistance is approximately equal to that caused by the film, and that the limit to the rate of flow would be reached when it was so rapid as to cause the liquid to assume the spheroidal state, when the water side of the surface would no longer be kept wet. This limit had not been attained in any of his experiments. The work of overcoming the resistance of the film did not entail a direct loss of heat, but it influenced the rate of transmission; and, indirectly, the thermal efficiency increased with better transmission. If the time was reduced 50 p.ct., certain unavoidable losses would also be halved.

The most convenient method of making an artificial resistance was to fix metal lugs or pegs on the flame side of the vessel, so proportioned in respect to diameter and length that the outer end would be maintained at a temperature about mid-way between that of the water and the flame. Unless this condition was secured, they would simply add a little to the heat receiving surface; but when this was obtained, they acted as thermal openings through the high resistance film, and enabled heat to pass rapidly to the water, as proved by the very quick boiling that would be observed immediately over the tops of the lugs. Experimenting with tin cups, without lugs, the heat flow was 1¼ gram-calories per square centimetre per second. With lugs, however, it was 4⅛; and the best conditions had probably not yet been obtained. This meant that a given quantity of water could be evaporated in one-third time, with a corresponding reduction in the consumption of gas. When solid fuels were used, as in steam-boilers of large size, the flame and the heating surface cannot be as well adapted to each other as with direct heating by gas-flames. This explains why a higher heat duty is obtained when boiling over gas-rings than with a large steam-boiler heated by coke or coal.

Low Increases in the Price of Gas.

Round about London there are some gas companies who have been able to "carry on" during war time with low advances in the price of gas. Reference was recently made to the fact that upon their 1914 price, the Hornsey Company have managed with only a 2d. increase. The Harrow Company have succeeded in doing likewise. The Lea Bridge Company have only gone up 4d.; the same with the North Middlesex Company. The Southgate Company have required an additional 6d.; and the Barnet Company made a 2d. increase do for some time, but have lately been compelled to add another 4d.

The latest Order to be made by the Local Government Board under the Calorific Standard Act is for the Borough of Stourbridge; the figure named being 500 B.Th.U. gross.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

High and Low Temperature Coal Carbonization—The "Financier" Articles.

Sir,—I have read with interest the articles by Mr. R. J. Barrett which have appeared in the "Financier and Bullionist," but the interest has turned into amazement.

Mr. Barrett, in the first place, takes what he calls three high-temperature processes, and gets rid of them contemptuously in a very few lines. The three processes to which he refers are gas-works, coke-ovens, and producer plant. Personally, I should not call producer practice a distillation process, although when coal or other bituminous material is used in the producer, distillation of a portion of the volatile matter does take place, with the consequent production of tar. This, however, is not high-temperature distillation; it occurs at the top of the producer, which is at a comparatively low temperature. At the lower part of the producer, where the temperature is high, no distillation takes place, but a regulated combustion which results in the formation of very large volumes of combustible gas used for power purposes.

Mr. Barrett's reference to the high-temperature retorting of coal for gas making is very inadequate, as is also his reference to coke-oven practice. When Mr. Barrett gets into low-temperature carbonization (and he only refers to one process), he gets absolutely inaccurate. As he only refers to one process—the Coalite—I might have let the inaccuracies pass, were it not that Mr. Barrett insists time after time that this is a low-temperature process. In any case, I have never heard the Coalite process claimed as a high-temperature system.

Let me as briefly as possible analyze what Mr. Barrett lays claim to for the Coalite "low-temperature" process. To commence with, he makes the following four claims:

1. Gaseous fuel for use under boilers (and for gas-works).
2. Oil fuel for maritime requirements, and light oils of the benzol series to replace petrol.
3. Sulphate of ammonia for fertilizers.
4. An ideal smokeless fuel for domestic use, and which can be used practically for almost all industrial purposes.

Following these claims, he contends that in the retorting of the coal by this process a yield of 20 to 26 lbs. of sulphate of ammonia per ton of coal carbonized is realized. Now the amount of sulphate produced will depend upon the amount and the nature of the nitrogen in the coal; and although he may obtain it from the Barnsley coals (which generally have a good nitrogen content), other coals containing less nitrogen would give a lower yield. He then goes on to say that further sulphate of ammonia is obtained by burning the "smokeless fuel" in a producer, when 60 to 80 lbs. of sulphate of ammonia are recovered. With a Barnsley coal, I should expect it to be greater; but what I want to draw attention to is this: If the fuel is to be employed for power purposes, it will not be available for domestic use and "practically all industrial purposes," whatever that may mean.

The other points are referred to in his sixth article. At the very commencement, he alludes to gaseous fuel, and makes the astounding statement that this gas gives 700 B.Th.U. after the light oils have been eliminated. This is a preposterous claim. The gas would probably be about 400 (possibly 450) B.Th.U.

The next sentences I will quote: "Low-temperature carbonization yields the maximum of oil-fuel; while only the minimum is obtained from the older systems. Its yield of benzol per ton of coal for motor spirit is three times as great as that of which the gas-works systems are capable."

Everyone agrees that low-temperature carbonization gives the largest yield of oil-fuel; and in saying this Mr. Barrett is forcing an open door. But when he claims a yield of benzol three times as great as that produced from coal by high-temperature processes, he is writing absolute rubbish. Benzol is only produced in minute traces by low-temperature retorting.

Following his statement about benzol, is a table of products claimed to be obtained by the Coalite "low-temperature" process. The products set out in this table could only be produced by high-temperature carbonization. Benzol, toluol, xylol, and carbolic acid are not produced by low-temperature carbonization. Random and absolutely incorrect statements like these have done infinite harm to low temperature projects. Such statements cannot be substantiated.

In another direction also Mr. Barrett does very great disservice to low-temperature processes, which he professes to champion. He sneers at high-temperature projects, and thus raises unnecessary controversy and antagonism. The coke-oven works and gas-works of the country supply the materials required for high-explosives, for aniline dyes, drugs, photographic chemicals, &c. None of the necessary raw materials for these products can be obtained by low-temperature carbonization. And yet in his seventh article, Mr. Barrett says: "How different the military position might have been in the earlier stages of the war had a sufficiency of low-temperature carbonization plants been available to supply cheap power and materials for high explosives, as well as oil fuel and motor spirit." Now had Mr. Barrett left out "materials for high explosives," I would have agreed that enormous advantage would have accrued to the Navy and transport by a supply of home manufactured oil by low-temperature carbonization; but, as I have already stated, materials for high explosives cannot be obtained by low-temperature carbonization.

On the other hand, low-temperature carbonization supplies motor spirit, fuel oils, lubricating oils, paraffin wax, and a smokeless fuel, or a fuel which can be used in producers for power purposes and ammonia recovery. Each process—high temperature and low temperature—has its place, and each is of the utmost importance to the country. Among other names, Mr. Barrett mentions that I have been converted to low-temperature carbonization. I have certainly not been converted to low-temperature against high-temperature. I am a great believer in low-temperature carbonization, and consider that it is essential for the Navy that low-temperature retorting plant should be put down at once in order that a home supply of oil may be obtained.

Mr. Barrett has been very badly coached; and articles such as he has written do the greatest harm to the cause of low-temperature carbonization. Let us put things in their right perspective. We must have high-temperature carbonization in the coke-ovens, to produce metallurgical coke—tar is here the bye-product. We must have high-temperature in the gas-works—tar is the bye-product. We must have low-temperature carbonization to obtain oil, petrol, &c.—here the oil is the main product, the other materials (ammonia and fuel) the bye-products. But, just as in the gas and coke-oven processes the bye-products help to earn revenue, so with low-temperature carbonization, which has for its object fuel oil, the bye-products are the most valuable assets.

In the next column to that occupied by Mr. Barrett in the "Financier" of Feb. 18, appeared an article on "Coal Economy." There again impossible products are stated to be obtained by low-temperature carbonization. I am afraid that the "Empire Resources Development Committee" have been as badly coached as Mr. Barrett, or have they been using him as their expert?

I am sorry to have trenched so much upon your valuable space, but these articles if allowed to pass without correction will do infinite harm.

F. Mollwo Perkin.

59, *New Oxford Street, W.C., March* 7, 1918.

Financial Hardships.

Sir,—Mr. Carpenter, in his letter appearing in your issue of the 26th ult., does not refer to the ruinous effect the most recent demands of labour (if conceded) must have upon gas companies. Further, the result of the recent meetings of the National Gas Council are most disappointing.

Now, if it is necessary in the national interests that the demands of labour be conceded, in all fairness the cost should fall on the nation, and not on the unfortunate shareholders, who are certainly as much entitled to consideration as the already well-paid labourers in, and proprietors of, coal mines.

I would, therefore, most earnestly appeal to Mr. Carpenter, Mr. H. E. Jones, and others who stand high in the profession, to lose no time in getting the companies into line, so that a unanimous appeal can be made to the Government for fair treatment, failing which the Government should be told that the companies, whose very existence is at stake, will have no alternative but to unanimously decline to make the advances demanded by the Unions.

I would suggest that an endeavour be made to bring about an arrangement under which the companies should pool their net revenues. The pooled revenues to be applied:

Firstly, in making up the deficiency to those companies who fail to pay their working expenses and/or their debenture interest, consequent upon any rise subsequent to the 1st of January, 1918, in the rate of wages or cost of coal.

Secondly, in paying dividends for the year 1918 and onwards at the rates paid by the companies for the year 1914, or 5 p.ct., whichever shall be the less—the Government to provide the amount of any deficiency required to make up such dividends.

I, of course, realize that many objections will be raised to this scheme, though I think none which should not be got over.

I enclose my card, but not for publication.

Vigorous.

March 4, 1918.

Price of Creosote.

Sir,—As the quotation of 4d. to 4¼d. per gallon which has appeared in the "Journal" for some weeks is almost equivalent to the maximum Government price of 75s. per ton for Admiralty specification oil, we are not clear as to how it is proposed to arrange business with (say) a mid-Yorkshire producer from whose works the cost of carriage to port would be at least ¼d. per gallon, without taking into consideration the charge for tank-hire, which would amount to about ⅛d. per gallon. Further, the quality of the creosote so purchased might quite possibly require treatment at the creosote installation to bring it up to the Admiralty specification.

Taking the Government price as 4¼d. per gallon, the net value of the creosote at the producer's works would be arrived at as follows:

Government maximum		4·25d. per gallon.
Less carriage to port	0·250d.	
,, tank hire	0·125	
	0·375	,,
Maximum value of creosote at maker's works .		3·875 per gallon.

Would the value not be more correctly expressed in the "Journal" as 3⅞d. to 4d. per gallon?

British Tar Products, Ltd., per A. E. Brown.

Sheffield, March 9, 1918.

Loughborough Gas Undertaking.—At the last meeting of the Loughborough Town Council, the salary of the Gas Manager (Mr. E. Onions) was increased by £50 per annum, to £425, with a free supply of coal and gas. It was reported in connection with the annual financial statement, that the gas undertaking was still in a flourishing condition, Alderman Mayo expressing the hope that, although it had uphill conditions to contend with through the high charges for coal and increased working expenses, it would still be able to make both ends meet. Replying to Mr. Charles, who controverted a statement made at the previous meeting, Mr. W. Cartwright said the only thing he had then asked was as to when the Committee would send more gas and less wind through the service pipes. Complaints had come from many factories, traders, and private consumers. Mr. Charles promised further information at the next meeting as to the statement that slot meter consumers paid 1s. 3d. per 1000 c.ft. more than ordinary consumers.

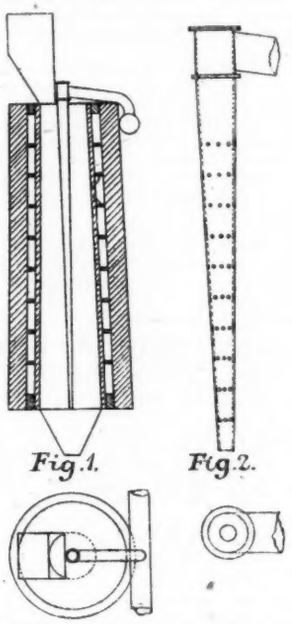
REGISTER OF PATENTS.

Distillation of Coal, Shales, &c., and Retorts therefor.—No. 112,793.

BILBROUGH, S. B., of Johannesburg, South Africa.

No. 576; Jan. 11, 1917.

In the present practice of distilling coals, oil shales, and the like in vertical retorts, the gases and vapours, containing the volatilized tars and oils, are (the patentee points out) removed by a pipe at the top of the retorts, after passing through condensers, wherein the vapours are separated from the non-condensable gases. It has long been known, he continues, that, by distilling coals at about 500° C, the yield of tar oils per ton of coal distilled is much increased, and the volume of gases decreased; also that the character of the oil distillate obtained is different at low temperature distillation to what it is at high temperatures—say, 800° to 1200° C. The reason usually assigned for this increased yield of tar oils, and its different character, is that the vapours come into contact with the surfaces of the retort walls at a comparatively low temperature, and are not decomposed or altered, as they undoubtedly are when the retorts are heated to a full red heat—say, 1000° C. The vapours, by coming into contact with the surfaces of red-hot walls of the retort, are decomposed, forming an increased yield of gas, and, consequently, a decreased yield of oil.



Bilbrough's Vertical Retort with Central Gas Off-take.

To overcome this difficulty, and to increase the yield of tar oils from coal, it has been proposed to lower the temperature attained in the retort to about 500° C., or even to 450° C., and, as a consequence of this comparatively low-temperature system of distillation, the yield of tar oils is increased by about 50 p.ct. The principal disadvantage of such low-temperature distillation is that the process is very slow, as it takes about four times as long to carbonize a ton of coal at 500° C. as it would at 1000° C.—other conditions being the same. Another disadvantage is that it is not so easy to make a good, hard well-binding coke from a suitable coke-yielding coal in retorts at the low temperature, as the coke then produced is much more friable than if the coal had been subjected to a full red heat in the retort.

In order to obviate these two serious disadvantages, he proposes to distil the coal or oil shale preferably in vertical retorts at the usual temperatures of from (say) 800° to 1200° C., and at the same time prevent the vapours or distillate from coming into contact with the hot walls of the retorts. This result is attained by inserting into the body of the coal being carbonized in the retort a central tube which has perforations down its length, so that the gases and vapours, as soon as they are generated, immediately travel to the nearest opening in the tube, pass up it, and are drawn away to the foul main and condensers. The central tube never becomes very hot, as it forms a core in the centre of the coal bed, and is the point furthest away from the hot walls of the retort.

As a result of numerous experiments he has carried out, in which he has drawn-off the vapours by a tube positioned centrally of the retort, at the same time keeping the temperature of the retort walls at a full red heat, he finds that there is a large increased yield of tar oils and a corresponding decrease in gas production, and that the nature of the distillate or oils is different from those obtained when no central tube is used. Without the central tube the colour of the distillate from coal is said to be a very dark brown black (the usual coal tar from gas-works and coke-ovens), and from shales the colour is a very dark olive green. When, however, the central tube is inserted and all other conditions maintained, the distillate from coal is of a dark olive green colour, and from shales a bright olive green. Further, the yield of tar oils is increased from 25 to 50 p.ct., depending on their composition.

He also claims to have discovered that the process possesses a further advantage—that the oils, being much thinner, do not tend to choke the pipes as when working without a central passage for the vapours. The time requisite, too, to carbonize coal or shale in a retort equipped with the central passage is very much shorter than without. In a retort fitted with the central tube the heat has only to travel across the annular space which is filled with coal—in other words, from the walls of the retort to the surface of the central tube; whereas in the case of a retort having no central tube the heat must travel in addition across the space occupied by the central tube, with the result that the carbonization is more complete.

Fig. 1 is a sectional elevation and plan of a retort fitted with the invention in the form of a tapered perforated tube. Fig. 2 is an elevation (drawn to an enlarged scale) of the tapered tube.

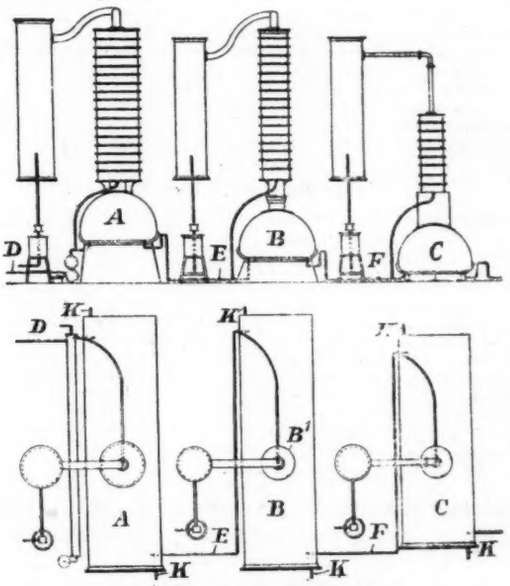
Fractional Distillation.—No. 112,966.

ADAM, W. G., of the Beckton Tar and Ammonia Products Works.

No. 18,671; Dec. 30, 1916.

This invention—relating to fractional distillation plant of the type in which the liquid to be treated runs continuously by gravity through the stills—is especially applicable for the continuous fractional distillation of the lighter hydrocarbons, such as benzene, toluene, xylenes, &c.

The plant, which consists in a particular combination of parts in themselves well known, has the following features: (1) Three or more separate stills, complete in themselves, and arranged at different heights so that the liquid to be treated may run continuously by gravity through them. But they are not superimposed. (2) The stills are divided into sections by plates, and are heated to different and increased temperatures by coils in which the heating vapour or gas travels in the reverse direction to that of the liquid, which is compelled by the plates to take a tortuous path. (3) Fractionating columns for each still are arranged immediately above them. (4) Means are provided whereby the liquid remaining in each fractionating column is mixed with the inflowing supply to its still.



Adam's Fractional Distillation Plant.

The illustration shows the distillation plant in elevation and plan.

The stills A, B, C, are arranged at decreasing heights; so that the liquid to be treated enters the still A through the pipe D and passes from it to the still B through the pipe E, whence it passes to the still C through the pipe F. The stills are similar in construction and are divided into sections by plates. The liquid, on entering, flows around the plates, and is heated by steam, which passes in the reverse direction through piping K. The steam is led from one still to another, entering the still C, from which it passes to B and then to A. The stills are connected to fractionating columns connected to condensers; while the liquid from the fractionating columns is led to the inlet pipes D, E, F, respectively.

The stills are heated to increased temperatures. A is heated to a lower temperature than the other two; and the unevaporated liquid in it runs through the pipe E into the still B, which is heated to a higher temperature than A; and, similarly, the unevaporated liquid from B runs through the pipe F into C, which is heated to a higher temperature than B.

Bunsen Burners.—No. 113,069.

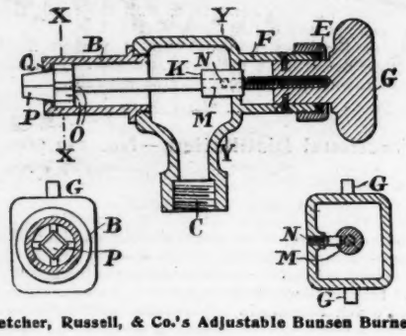
FLETCHER, RUSSELL, & CO., LTD., FLETCHER, THOMAS W., and BANKS, W., of Warrington.

No. 11,879; Aug. 18, 1917.

This invention relates to atmospheric and pressure or blast bunsen burners wherein a single needle valve or adjuster, operated by screw and nut mechanism, co-acts with the orifice of the nipple through which the gaseous vapour issues to the mixing chamber, "to entirely cut-off the supply of gas or vapour, or to regulate the supply as required and simultaneously adjust the effective area of the orifice according to the supply." The object aimed at is to provide an

arrangement of single valve for simultaneously controlling the gas or vapour supply and adjusting the effective area of the nipple orifice.

The illustration shows a longitudinal section and transverse sections on the lines X and Y.



Fletcher, Russell, & Co.'s Adjustable Bunsen Burner.

To the casing is connected the nipple B, while the gas supply pipe is connected at C. In the nipple is mounted a stem the rear end of which screws into a rotatable nut E in a tubular extension of the casing and provided with an operating part G. The nut is prevented from moving axially in the extension F by screws co-acting with a circumferential groove in its periphery. Near its rear end, the stem is formed with a boss K provided with a longitudinal groove M, with which a pin N co-acts to prevent any rotation of the stem. The forward end of the stem is maintained centrally in the nipple by wings O, and has a tapered portion to co-act with the nipple nozzle Q, which is correspondingly fashioned.

With the stem in the position shown, the portion P completely closes the nipple orifice Q and entirely cuts-off the supply of gas. As the stem is moved to the right, the portion P gradually opens the orifice Q, and not only is the gas supply slowly increased, but the effective area of the nozzle is also increased. On the stem being moved in the opposite direction—*i.e.*, to the left—the portion P gradually cuts off the supply of gas until it completely closes down the supply.

Gas Water-Heaters.—No. 113,112.

FAIRBROTHER, H.; a communication from D. W. ALLMAN, of Toronto, Canada.

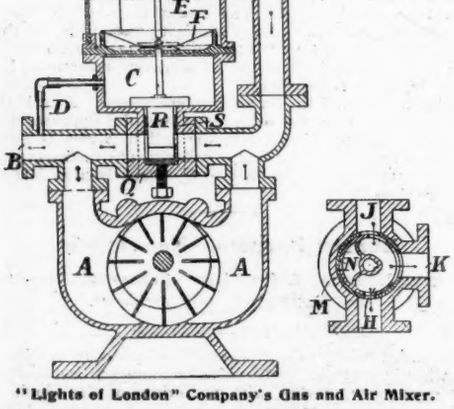
No. 81; Jan. 2, 1917.

The principal feature of this invention consists in providing a control for operating the gas-valve so as to deliver a desired quantity of fluid into a receptacle, which operates by gravity to open the gas-valve, and in which provision is made for the gradual release of the fluid so as to effect the ultimate closing of the valve at a predetermined period. The fluid receptacle is operatively connected with a damper controlling the flue leading from the heater, and opens the flue coincident with the opening of the gas-valve and closes the flue upon the closing of the gas-valve—the manually operated fluid control being adapted to be operated from points distant from the heater.

Supplying Mixtures of Gas and Air.—No. 113,160.

LIGHTS OF LONDON, LTD., and DOCKING, A., of High Road, Streatham, S.W.

No. 2950; Feb. 28, 1917.



"Lights of London" Company's Gas and Air Mixer.

This invention relates to apparatus for supplying gas and air at any desired pressure, of the type described in patent No. 18,130 of 1910. The main object of the present invention is "to provide better facilities for adjusting the apparatus, so that it will supply the two gases comprising the mixture in their proper proportions, maintain the mixture constant under the varying demands of the service, and be more certain in its action, so that it requires less attention."

A sectional elevation of the apparatus is given; also a sectional plan of the mixing chamber, inlet ports, and inlet valve.

The service pipe B is directly connected to the compressor A; and a chamber C, above the compressor, is connected to the pipe by a branch connection D. Above C is a chamber E containing a diaphragm F; and the mixed gases are admitted into the chamber below the diaphragm through a small opening in the top, so that the diaphragm is subjected to the service pressure, but is protected from sudden variations. Above the diaphragm is a vertical cylindrical mixing chamber G, provided with two inlet ports—one H for gas, and another J for air; while one outlet K is provided, which is connected to the inlet side of the compressor by a pipe L. The chamber G is fitted with a liner M; and the inlet ports H J are formed in this liner.

These two inlet ports are controlled by a hollow cylindrical piston valve N (sliding vertically within the chamber G), provided with gas and air inlet ports, corresponding to the inlets H and J of the chamber G. It is connected to the diaphragm F by a rod which passes down through an opening in the top of the chamber E and rests on the top of the stem, so that the valve is raised and the inlet ports H and J are closed to a more or less extent when the diaphragm is raised by the service pressure.

The inlet ports are both open when the valve N is in its lower position, and both are closed when it is raised to its upper position; while the ports in the valve are so disposed that, by an angular movement of the valve itself, the width of one inlet can be increased and the other diminished; so that the proportions of the admitted air and gas are regulated.

The conduit L, which connects the outlet K in the mixing chamber G to the compressor A, is connected to the service pressure pipe B by a bye-pass pipe carried under the chamber C, and provided with a valve casing Q fitted with a rising and falling cylindrical valve R. This valve (closing the bye-pass branch when it is in its lower position) is directly under the diaphragm stem and is secured to the lower end of it, so that it is raised by the diaphragm when the latter is raised. The bye-pass branch is thus opened to compensate for the closing of the gas and air inlets.

To provide independent adjustment for the valve R, so that it will compensate for the action of the inlet valve N, it works in a liner S, which can be angularly adjusted in the valve casing Q, or be raised and lowered by a screw to increase or diminish the area of the valve port.

Gas Cooking Stove.—No. 113,204.

SCOTT, C. H., of Gloucester.

No. 6764; May 12, 1917.

The apparatus consists of a rectangular box open at the top, with the front and sides hinged so as to give access to the interior. It is made of tinplate or other similar reflecting substance; and the gas-fire (a vertical incandescent fire, like an ordinary gas-stove) is placed to the back of it. The fire has a sheet of non-conducting substance at the back so that the heat is thrown forward. The top of the box is open, and the top edges have grooves in them transversely so that a bar can be placed on them, which allows the material to be toasted to be put nearer to, or farther from, the fire.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for March 6.]

Nos. 3268—3732.

CARR, M.—"High-pressure gas distribution." No. 3688.
CLARKE, E. F.—"Fluid meters." No. 3413.
DAY, D. T.—"Extraction of hydrocarbon products from shales and coals." No. 3521.
FAIRWEATHER, J. H.—"Washing coal gas, &c., with oil." No. 3506.
GAS-METER COMPANY.—"Wet gas-meters." No. 3513.
GRIGSBY, B. J. & O. E.—"Lighting fixtures." No. 3606.
HARRINGTON, J.—"Gas and electric fittings." No. 3643.
HUWEL, G.—"Coal-gas carburettors." No. 3392.
IONIDES, A. C.—"Mixing constituents of a combustible gaseous mixture." No. 3725.
LA DEVESA, R. R. R. DE.—"Compounds for increasing calorific value of coal, &c." No. 3447.
LE DUC, F. T.—See Huwel. No. 3392.
LOVE, W.—"Stopcocks or valves for liquid or gas." No. 3675.
LYMN, A. H.—"Producer-gas plant." No. 3715.
NASH, W. A.—See Gas-Meter Company. No. 3513.
NITROGEN CORPORATION.—"Process for producing substantially pure cyanogen compounds and derivatives thereof." No. 3415.
REW, R. J.—"Water-gas producer." No. 3282.
RIDEAL, E. K.—"Removal of sulphur and sulphur-containing bodies from gases." No. 3702.
RUSSELL, W. H.—"Distillation of carbonaceous, &c., substances, such as coal, shale, peat, &c." No. 3232.
TABRAR, J.—"Tool for making joints in pipes, tubes, &c." No. 3341.
TAYLOR, H. S.—See Rideal. No. 3702.
TUCKFIELD, C.—"Continuous fractional distillation apparatus." No. 3356.

In all, 127 German patents have now been licensed to British Dyes, Ltd., under the war-time Patents Court procedure. Application in regard to the last twelve of these patents was made quite recently; and British Dyes, as before, agreed to royalties of 2½ p.ct., and 1 p.ct. for intermediate products.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The following Bills were read a second time and committed; the Committees to be proposed by the Committee of Selection:

British Gas Light Company (Norwich) Bill; Brixham Gas Bill; Chepstow Gas Bill; Pontypool Gas and Water Bill; Wandsworth, Wimbledon, and Epsom District Gas Bill.

HOUSE OF COMMONS.

Financial Hardships Bills.

After several postponements, twenty-one "Financial Hardships" Gas Bills were down for second reading last Wednesday; but this stage was then further deferred until yesterday (Monday).

Mr. Lough has given notice, on the second reading of the Gas Light and Coke Company's Bill, to move—"That it be read a second time upon this day six months."

A similar motion by Mr. Rowlands in connection with the South Suburban Gas Bill has already been recorded.

Mr. Hudson gave notice, on second reading of the Brentford Gas Bill, to move—"That it be read a second time upon this day six months.

Major Goldman gave notice in similar terms.

Progress of Bills.

The following Bills were presented, read the first time, and ordered to be read a second time:

Alliance and Dublin Gas Bill; Rhymney and Aber Valleys Gas and Water Bill.

Mr. Field and Mr. Hearn gave notice, on second reading of the Alliance and Dublin Gas Bill, to move—"That it be read a second time upon this day six months."

Rotherham Corporation Bill.

The Court of Referees met last Tuesday, to hear objections to the *locus standi* of certain petitioners against the Rotherham Corporation Bill. Among them was the Swinton and Mexborough Gas Board; but Mr. Vesey Knox, K.C., for the promoters, said a letter had been received stating that the Gas Board did not propose to appear on their petition. In the circumstances, the Court disallowed the *locus*.

Lurgan Gas-Works' Labour Dispute.

Mr. TYSON WILSON asked the Minister of Labour whether his attention has been called to the action of the Lurgan Urban District Council in refusing to be party to arbitration proceedings, for which his Department appointed an Arbitrator for the hearing on Sept. 21, 1917, to consider the claims put forward by the Council's employees in the gas-works; whether he was aware that, in consequence of this action on the part of the Council, a number of the workmen came out on strike and that the dispute still continued; and what action he proposed to take in the matter.

Mr. G. ROBERTS said he was aware of the difference to which Mr. Wilson referred; but as the Lurgan Urban District Council were not subject to the Munitions of War Acts, arbitration proceedings could not take place otherwise than by consent, which the Council were not prepared to give. He was addressing another communication on the subject to the Council.

Mineral Oil Supplies.

Sir HEDWORTH MEUX (Admiral of the Fleet) asked whether the attention of the Government had been called to the meeting of the Institution of Petroleum Technologists at the Royal Society of Arts, on Feb. 19, at which it was stated that an immense amount of mineral oil could be produced in this country from cannel coal; whether the Government were aware that many millions of tons of cannel coal (from which an average of at least 35 gallons of oil per ton could easily and speedily be obtained) were now lying neglected on colliery waste heaps; and whether, in view of the necessity of obtaining oil for the Navy and reducing the tonnage now employed in importing oil into this country, the needful steps for working this source of oil supply would be at once initiated.

Sir WORTHINGTON EVANS, who replied, said that he could not add anything to the full statement he made in the debate on the 28th ult. [see "JOURNAL," March 5, p. 454].

Sir HEDWORTH MEUX asked whether, since the outbreak of war, a German subject, Dr. Ludwig Diehl, was released on a medical certificate, sent back to Germany, and was now working or superintending retorts on Westphalian coalfields to obtain oil; whether, previous to the war, Dr. Diehl used a retort at Chiswick in which samples of Westphalian coal were satisfactorily tested to produce oil; and whether the proportion of oil thus obtained was greater or less than could be obtained from British cannel coal.

Sir GEORGE CAVE (Secretary of State for the Home Department), who replied, said Dr. Ludwig Diehl was a metallurgical chemist who had been mainly occupied with the improvement of processes for the extraction of gold. In accordance with the agreement with the German Government he was allowed to return to Germany in January, 1917, as he was then over fifty-five years of age and suffering from angina pectoris. In March, 1917, he was under treatment in a nursing home in Berlin. He had no information as to his present occupation in Germany nor as to his alleged experiments in this country before the war.

Sir HEDWORTH MEUX asked if inquiries would be made to find out whether this released German was not now doing for the German Government what our Government refused to do for the people of this country.

Sir GEORGE CAVE replied that he had no means of ascertaining what he was doing in Germany.

LEGAL INTELLIGENCE.

UNLIGHTED STREET STANDARDS.

Liability for Damage Caused by Collision.

At the Lambeth County Court on the 4th inst., Judge Hodges gave a considered judgment with reference to the lighting of street standards when the ordinary light had gone out. It arose out of an action brought by F. D. Baldock, a taxi-cab proprietor, of Kennington, against the Westminster City Council and the Charing Cross, West End, and City Electricity Company, Ltd., for damages to his cab through a collision near Trafalgar Square with an unlighted refuge in the street.

His HONOUR said the action was brought by the plaintiff against the defendants for alleged negligence in failing to have a street refuge in Cockspur Street, in the City of Westminster, properly lighted, in not supplying a proper lamp for the refuge, for failing to place a red lamp or other warning on the said refuge, and for alleged negligence in placing on the highway a refuge and standard which were a nuisance through not being properly lighted. During the hearing, the defendants, the Charing Cross, West End, and City Electricity Company, were dismissed from the action by consent. The action was tried before him and a Jury. At the end of the plaintiff's case, Mr. Lort Williams, on behalf of the defendants, the Westminster City Council, submitted there was no case to go to the Jury on the grounds that there was (1) no obligation on the defendants to light the refuge, and (2) no evidence of negligence. He (the Judge) decided that, without prejudice to the defendants' rights and contentions, it would be safer to leave certain questions to the Jury. The questions which were left to the Jury, to which are added their answers, were as follows: (1) Was the accident due to the inevitable causes in the reduced conditions of street lighting?—No. (2) If nay, was it due to any negligence on the part of the defendants—the Westminster City Council?—Yes. (3) What was the negligent act or omission causing the accident?—Omission to maintain a danger lamp at the refuge. (4) Was the accident due to, or contributed to by, the plaintiff's own negligence?—No. (5) Was the light on the refuge alight at the time of the accident?—No. (6) If it was out, what caused it to go out?—In our opinion there is no conclusive evidence to show the cause. The case stood over for further consideration, when Mr. Lort Williams contended that, notwithstanding the findings of the Jury, the defendants were not liable in law.

His HONOUR said the facts were shortly as follows: The Westminster City Council are the successors of the St. Martin's Vestry, and the refuge, together with the standard on which there is an electric light, were placed in the position which they now occupied by the Vestry. The refuge had guard posts at certain ends, with a standard lamp in the centre. Since August, 1914, owing to the war, a number of Orders had been made by the Home Secretary ordering the various councils in London to diminish the normal lighting of the highways and streets. At one period an Order was issued that all street lamps should be extinguished; and at the time of the accident in question all lighting in the streets had been ordered to be considerably diminished. The defendants had great difficulties in complying with these various Orders. The difficulty was occasioned by the automatic arrangements to keep the carbons in the lamps in position. The electric power had to be reduced, with the result that in some instances the carbon stuck, and the light was temporarily extinguished. On March 20, 1917, about eight p.m., George Tattersall, a taxi-cab driver employed by the plaintiff, in driving along Charing Cross and Cockspur Street, drove against the guard post of the refuge, causing the damage to the taxi-cab; and it is in respect of this damage that the claim was made. Tattersall stated that the light on the refuge was out; and the Jury had so found. At the hearing on further consideration, Mr. Lort Williams contended that defendants or their predecessors, the St. Martin's Vestry, had statutory authority under section 108 of the Metropolis Management Act, 1855, to place the refuge in the street, and that there was no obligation imposed upon them either (*a*) to light or (*b*) to give warning by light that it had been placed there. He drew attention to the wording of the section, and said it was clear that an obstruction of the highway to carriage traffic was anticipated, because the object of the section was to render the crossing less dangerous for foot passengers, and not to render it less dangerous for carriage traffic. He (the Judge) did not think it was necessary to determine the point, because, although there might be no obligation on a person to perform a particular duty, yet if the duty was undertaken, and improperly or negligently performed and actual damage was occasioned thereby, the person injured had good cause for action. In the present case, the defendants and their predecessors had undertaken the lighting of the refuge; and therefore, if they had done it improperly or negligently, they were liable. But Mr. Lort Williams had argued that, even if this was so, the defendants had fulfilled their obligations and duties by placing a standard on the refuge with a light, which might reasonably be expected to keep alight, and if alight would well and sufficiently light the street or give warning that the refuge was there. In his (the Judge's) judgment, this was a correct statement of the defendants' duties and obligations. Mr. Lort Williams further contended that the Jury, by their answers to the third, fifth, and sixth questions, had negatived the allegation that the actual lighting was negligently carried out by the defendants. He (his Honour) thought he was right in his contention, because the Jury found by their answer to the third question that the defendants' negligence consisted in the omission to maintain a danger light on the refuge, and not that the lighting was negligently carried out by the defendants.

Taking this view of the case, it became necessary to consider whether the defendants, who were acquitted by the Jury of any negligence in the way in which they carried out the actual lighting, were bound also to place and maintain a danger lamp on the refuge, and

whether there was any evidence upon which the Jury could find that the defendants were negligent or not in so doing. Mr. Newman, on behalf of the plaintiff, contended that a danger or red lamp ought to have been placed on the refuge, to indicate to the public that the light, which had previously existed, was no longer there, and said he did not contend that defendants ought to put a danger lamp on every refuge in their area, but only on those lamps which were likely to go out.

On behalf of the defendants, Mr. Thorpe had said that the total number of standard lamps on refuges in the defendants' area was 145; and Mr. Voit stated that during the period of twelve months on only fifty different occasions at the outside had one of these lamps gone out.

Having gone through the evidence very carefully, his Honour concluded, he could not find a scintilla of evidence that this particular lamp had gone out before the particular night of the accident, or that the defendants knew it had gone out or was likely to go out. Nor could he find any evidence that defendants knew, or ought to have known, it had gone out on the night of the accident before the accident occurred. In the circumstance, he thought it would be unreasonable to hold that the defendants were bound to provide against the contingency of a particular lamp going out; and he did not think there was any evidence upon which a Jury could find that the defendants were guilty of negligence in the omission to maintain a danger lamp on the refuge in question. He must, therefore, enter judgment for the defendants with costs.

Cashier Charged with Theft.

Alan Johnson Turner, cashier to the Heckmondwike and Liversedge Gas Company, whose disappearance has caused anxiety for some little time past, has been found, and appeared at the Dewsbury West Riding Police Court, last Wednesday, charged with the theft of £121, the property of the Company. It was said that a very substantial amount is actually involved; and the case was remanded (bail being allowed) for investigations of the books.

Theft from the South Metropolitan Gas-Works.

At the Greenwich Police Court, on Saturday, Charles Stevens, labourer, was charged with the theft of 1 cwt. of lead, value £2, the property of his employers, the South Metropolitan Gas Company, from Phœnix Wharf, East Greenwich. Detective Horrell proved seeing Stevens in Deptford, with a barrow on which were two sacks, which, on being questioned, he admitted contained lead. This he first said he had got from the gas-works and other places where he had worked; but later he confessed he had taken it from the gas-works at Blackwall Lane. He had brought it out a bit at a time, until he had enough to sell. Prisoner pleaded guilty. He was described as a man of good character, who had been employed a twelvemonth at the gas-works, where he was in receipt of from £5 to £5 10s. weekly. Recently the leakage of metal at the works had been serious. In view of Stevens's good character, Mr. Disney fined him £5.

Dublin False Pretences Case.

Oliver Newell, described as agent of a Gas Economizer Syndicate, was at the Dublin City Sessions sentenced by the Recorder to three years' penal servitude for obtaining from James Holty £100 by, as alleged, falsely pretending that he had power to appoint agents for and on behalf of Messrs. Lords, Ltd., furnace manufacturers, of Stockport, and had authority to receive money deposits for that firm. Holty said he was appointed by Newell as an agent for various types of machinery and a gas economizer. He gave Newell £100 in cash for security. Accused gave him a receipt on which were marked the words "Gas Economizer Syndicate." Mr. Joseph Lord said he appointed Newell their agent in Ireland; but he never sent an order and never earned a shilling on commission. He had no authority to appoint agents, pay salary, or receive money security. Newell said Lord had nothing to do with the Gas Economizer Syndicate.

Gas-Works as "Munitions Works."—The Gas Committee of the Bury Corporation last Friday considered an application from the Bolton and District Gas-Workers' Association and the Municipal Employees' Association for a 12½ p.ct. war bonus for the men employed at the gas-works. The Committee decided not to accede to the request; and the matter will now go to the Committee on Production. The National Union of General Workers and the Municipal Employees' Association have also made similar requests to the Oldham Gas Committee, contending that they are "engaged in engineering work on munitions" and therefore entitled to participate in the award granted by the Ministry of Munitions to time workers. Gas-works, the Unions claim, are munitions works. The Gas Committee have decided to recommend the Council to refuse the application.

Cork Gas Undertaking.—Mr. W. B. Harrington, who presided at the general meeting of the Cork Gas Company, said the report stated that, as compared with the corresponding half year of 1916, the accounts showed a small increase in the consumption of gas. The cost of production continued exceptionally high, and the greatest difficulty was experienced in getting coals and supplies of all kinds. The balance of profit and loss was £2753; and it was proposed to pay a dividend at the rate of 6 p.ct. per annum, which would absorb £3290, requiring £537 to be taken from the reserve fund. At one time their stock of coal ran so low that there was danger of the city being without gas light. In order to keep going they had to take any coal they could get, and to bring cargoes *vid* Dublin and thence by rail to Cork, involving enormous extra cost. The average cost of coal in the six months to Dec. 31 was about 45s. 6d.; and since the beginning of this year it had gone up to 54s. 8d. They had also during the half year great difficulty in getting materials for repairs, and they had not been able to obtain sufficient supplies of stoves and slot meters. There had been a slight increase in the consumption of gas, due chiefly to the more extensive use of stoves. The report was adopted.

MISCELLANEOUS NEWS.

INCREASED PRICE OF GAS AT BIRMINGHAM.

At the meeting of the Birmingham City Council on Tuesday last, Sir Hallewell Rogers moved the adoption of the report of the Gas Committee, and of a supplementary report. The latter showed that in June of last year the Council sanctioned an increase in the price of gas to meet the advanced cost of manufacturing materials and wages. Since then, further advances in wages had been granted—3s. per week from Aug. 1 and an additional 5s. per week from Dec. 1 last. Notwithstanding these increases, the Committee hoped to avoid further raising the price of gas; but an award of 12½ p.ct., granted by the Committee on Production to men employed in the gas, water, and electric supply departments, deciding that the bonus be paid from the first pay week following Feb. 14 last, represented an increase of approximately £50,000 per annum in the wages bill of the Gas Department. The Gas Committee therefore recommended that the price of gas be increased from the March 1 reading of meters by 1d. per 1000 c.ft.

Sir Hallewell Rogers observed that the increase in the demand for gas in 1917 over 1916 was as great as in any of the five-year periods before the war. The summer load in 1917 was nine times that of 1876; while the maximum load was three and a half times more. But for this improvement in the load factor, gas-works one and a half times larger than the present size would have been required in Birmingham to cope with last year's output of gas. The scarcity of gas coal had become acute—in fact, the low stocks were causing disquietude. As a result of strong representations made to the Controller of Coal Mines, coal was being sent from Durham in Admiralty wagons. This coal was, however, unscreened, and was unsuitable for vertical and inclined retorts, and its use in the plant had served to reduce its manufacturing capacity. Labour difficulties were likely to be increased by the new "combing out" regulations. The explosives Department of the Ministry of Munitions was assisting the Committee in the procuring of additional plant. The utmost economy in consumption on the part of the public was essential.

Sir Hallewell referred with much satisfaction to the progress made by their Industrial Research Laboratory, under the direction of Mr. Walters, and to the fact that the value of its work was recognized by Government Departments and by the manufacturers of Birmingham and the Midlands. The department much regretted the resignation of Captain Hilton, who, in his new sphere of work, with the Metropolitan Carriage and Wagon Company (Saltley), would continue his duties on behalf of the Government. Mr. A. W. Smith, the new Secretary, had been in the service of the department for twenty-three years.

The report was approved after Alderman Clayton had expressed warm appreciation of what was being achieved by the Industrial Research Laboratory. The aid of science to industry had he said been badly needed in Birmingham; and he hoped to see further developments in this direction.

On the suggestion of Mr. Pepper, it was decided to arrange for an inspection of the Birmingham undertakings by the aldermen and members of the City Council.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

Twenty Per Cent. Increase in Sales.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon, M.Inst.C.E., the Chairman, presiding.

The Secretary (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

Increased Sales of Gas.

The Chairman, in moving the adoption of the report and accounts said the outstanding feature was the extraordinary increase in the sale of gas during the six months ended Dec. 31. An increase of 20 p.ct. in the volume of gas distributed might be calculated to disturb and derange the affairs of any gas undertaking, however well organized; and when it came upon a Company already embarrassed in almost every particular in regard to the discharge of their duty, it would be readily surmised that the difficulties had been so great that the administration and executive had not been able to foresee from week to week how they could have been surmounted. He had often drawn attention to the exceptional circumstances of their Company in regard to obtaining raw materials, and also in regard to the details of the supply of gas. They were limited to a small port, and had to face all the well-known jeopardies of marine transport; and when they were called upon, without being able to foresee or pre-estimate it, to meet such an increase as he had mentioned, the proprietors would understand what an anxious time it had been for the Board and the officials. They had, of course, to a certain extent prepared themselves for the difficulties of the winter supply, in regard to price and other matters; but the increase in the price of coal that was allowed in the middle of last autumn by the Controller of Coal Mines disturbed any financial dispositions that had been made. The price of gas was increased 2d. per 1000 c.ft. at the New Year; and this was to have its consequence yet reflected in a further diminution of the dividend as compared with that now recommended. The first figure in the accounts to which he would draw attention was the unprecedentedly low one to which the capital actually raised per million c.ft. of gas sold had fallen (£408), by reason of the fact that they had expended practically no capital during these six months. The additional quantity of gas sold, too, had had its effect upon the figure. But in this connection it must be remembered that there were loans from the bank which were applied mainly to the requirements of working capital. Even so, however, the

capital stood at such a low rate as to materially relieve the situation that they would otherwise have had to meet. On the credit side of the revenue account, there were a series of increments as important as they were welcome. The total rental for gas, meters, stoves, and fittings had increased by over £38,000, and residuals by only £8558; while the total additional income was just over £47,000. On the other side, coal, oil, and coke alone had cost nearly £45,000 more; and wages in the retort-house alone had increased by £3854. Of course, such a huge increase in the cost of coal should have a proportionate set-off in the return from residuals; but this was not, and could not be, the case with them. Coal was now costing their Company 40s. per ton, as against between 18s. and 19s. per ton before the war. Round the Metropolis, however, and in those areas contiguous to the Brighton Company's which were dependent upon railways alone, coal had cost on an average between 27s. and 30s. per ton since the war; and the coal bought at this price regulated the cost of coke to the consumer. So that, although in the case of Brighton the increase in the cost of coal had been 150 p.ct., against less than 100 p.ct., their residuals were held down by the prices charged for coke in and about London. They could not charge the consumer more for their coke than he could obtain it for, as an alternative supply, from the districts to which he had referred. The total expenditure was nearly £51,000 more than in the corresponding period; and the profit, at £21,126, was £3750 less. Payments to employees to meet the increased cost of living, aircraft insurance, and allowances to dependants of those men who were serving at the front, amounted in themselves to over 2d. per 1000 c.ft. of gas. There was in profit and interest £21,154; the amount needed for interest and the now very important item of income-tax was £5247; and for the dividend there was required £18,689. There was thus a deficit on the half year of £2783, or about ½d. per 1000 c.ft., which was not a large amount to be out in the circumstances. In the maintenance of the works, and what referred to depreciation and other important matters, they had been able to improve the ratio of charges as compared with six months ago; and the amounts brought to book in this account under these heads would, before the war, have constituted very ample provision for all requirements. But the purchasing power of money in this regard was very much less now than it was; and what would have been a full provision then, could not be calculated upon to effectuate the same kind of repair and maintenance at the present time. They had, however, done all that was strictly necessary, and more than a great many other companies.

THE SLIDING-SCALE.

They would remember that on the last occasion on which he addressed them, reference was made by him to the sliding-scale, and the heavy disabilities that its operation imposed upon gas undertakings. Since then, some efforts had been made to draw the Government's attention to the matter, and to obtain their recognition of the hardship under which the companies were labouring. But up to the present, no particular degree of success had attended any such effort. He ventured to express the opinion then that if a moderate and a fairly-stated request had been made to the Government, there was a considerable prospect of success in getting Parliament to treat the whole case comprehensively upon a general principle. The form of application was discussed at great length; and when it was made, he did not think it was either moderate or lucid. As he understood, the request of the gas undertakings as represented in the matter, the sliding-scale was only to operate to the extent of 20 p.ct. of its scale. Well, to his mind, to make a request of this kind was simply to add supercomplication to an already complicated matter. The sliding-scale was not easily understood by those who were not responsible for putting it into practice. Parliament frequently thought it did understand, when he did not believe it did. Such a request as this, as he had said, was simply to confuse a matter already too confused in the Governmental mind; and, furthermore, to ask that the sliding-scale should only be modified by such a trifling extent, and that benefits of the kind involved should be preserved to the proprietors, did seem to him to savour of cupidity, and a certain want of self-sacrifice on the part of the gas undertakings. He never thought that the Government would consent to it; and they refused. Now the matter had fallen apart, so that each company as affected had made independent application to Parliament; and, of course, whatever might be the result, it could not be attained until much of the damage had been done, and irreparably done, to the finances of the companies involved. If the application to Parliament had been a simple and clear-cut one, in that it said, "Let the standard dividend at the standard price be the minimum for the duration of the war," he thought that Parliament would have understood this. They would not have suspected anything latent in such a suggestion; and he believed they would have dealt with the whole subject upon this simple basis. But the application was not made in these terms; and now they had to go through the tedious process of self-determination in regard to any particular company that might put its case before Parliament in the ensuing session.

THE QUESTION OF LABOUR.

Another very important point as affecting these accounts had been the question of labour. All undertakings had suffered. It had been proposed, he believed, that there should be a conference between the representatives of labour and the aggregated interests of gas undertakings to discuss the matter, with an idea of agreement to actuate in the future; but he could not help thinking there were many difficulties as opposed to such a suggestion. In the first place, the circumstances of different gas undertakings were not the same; and the Government were very apt to treat them as though they were the same. The case of a company who had made practically no advance in wages since the beginning of the war was apt to be regarded by the Government as identical with that of the undertaking which had made most additions to wages, and, without regard to the difference so constituted, to impose a heavy bonus upon both. It was extremely disheartening to employers who had anticipated the difficulties of their workpeople, and had made advance upon advance in relief of such difficulties—only to find that the Government treated them, in the matter of the war bonus, exactly the same as if they had made no advance whatever. If gas undertakings—companies or municipalities—did agree to any such basis, it would be binding upon them in principle and in practice. What they undertook to do, they would have to do; and if they did not, then the Government could make them do it. But if labour entered into an agreement, what security had employers that they would abide for one moment by the conditions upon which such an agreement might be arrived at? Therefore it seemed to him that any settlement reached in this way might easily be one of the description which was vulgarly termed, "Heads, I win; tails, you lose."

SUGGESTED RESTRICTIONS ON GAS CONSUMPTION.

The Company had received an intimation that there were likely to be imposed upon the use of gas important restrictions during the next winter. These limitations would be based upon the fact that it was impossible to provide the raw materials to maintain the output of gas equal to that during the season from which they were now emerging. It was not for him to discuss the necessity or otherwise of such a step. But the question did arise as to what method would be adopted by which this limitation might be enforced. He was told that on the Continent the onus was upon the consumer, who had, under penalty, to keep within stated limits. However, he ventured to think such a scheme would not work very well if applied to British consumers. The privilege of the Englishmen for many years past had been that he was entitled to be a wasteful person; and if they asked the consumer to undertake any definite duty in regard to the use of gas by himself, he did not think it would be carried out. In other words, if this limitation depended upon the action of the consumer, it was, to his mind, largely foredoomed to failure. If the thing was to be done at all, he thought the only effective way would be for the Government to say to the gas undertakings, "You will only receive so much raw material for the production and sale of gas to the public; and you must do the best you can with it." Then he believed the companies would be able to very materially mitigate the consequences to the public of any such limitation, by altered methods of manufacture, by changes in the distribution of the gas, and in many ways which would suggest themselves naturally to those who were conversant with gas administration.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion, which was agreed to without discussion.

On the proposition of the CHAIRMAN, seconded by Mr. A. F. PHILLIPS, dividends were declared at the statutory rates per annum of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 9 p.ct. on the original ordinary stock, and 6 p.ct. on the "A" ordinary stock.

Thereafter the retiring Directors (Mr. A. M. Paddon and Lieutenant-Colonel C. L. Morgan) were re-elected, on the motion of the DEPUTY-CHAIRMAN, seconded by Mr. A. W. OKE, and supported by Mr. PHILLIPS; and the retiring Auditors (Messrs. G. Crispe Whiteley and William Cash) were also re-appointed.

Mr. FRANK H. JONES proposed a very hearty vote of thanks to the officers, staff, and workmen; remarking that they had successfully contended against great difficulties.

Lieut.-Colonel C. L. MORGAN, in seconding, pointed out that the Directors and proprietors could not be sufficiently grateful to those who served them for all they had done.

The vote was supported by the CHAIRMAN, who drew attention to the fact that, in spite of all the difficulties, the pressure of the gas was not reduced on one single occasion during the whole of the winter.

Mr. BURTON and Mr. C. H. RUTTER (the Engineer and General Manager) having briefly replied,

A vote of thanks was, on the proposition of Mr. OKE, accorded to the Chairman and Directors.

NORTH MIDDLESEX GAS COMPANY.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said there was nothing in the accounts to reflect the very difficult circumstances from which they had been evolved. Indeed, there was nothing of an abnormal kind to which it was his duty to call attention. The increase in the Company's business, while an important one, was not excessive to the extent of being troublesome to the Company; and it did not occur at that period of the season at which it would have represented the maximum inconvenience to them to meet. They would observe that the full dividend would be paid, as on the previous occasion; and that the financial situation, which was before favourable, would preserve this character after they had done so. It had been extremely difficult to regulate the price of gas to meet the exigencies of the Company. So soon as the Board had arrived at any estimate of the demands upon them, and had fixed the price in accordance therewith, some disturbing element over which they had no control came along and deranged the whole position. This was the case when they reduced the price in September. Almost immediately the price of coal was advanced, without them having had any tangible intimation of what was before them, by 2s. 6d. per ton. Certain increases in their disbursements had gone on continuously—such as their allowances to workmen, which had, with their Company as with others, been conceived upon a very generous scale indeed. The increase in cost of materials also went on, so that they could not say at what point it would be arrested. There were several factors in the condition of the Company which were strongly in their favour—notably the capital, which stood at £611 per million c.ft. sold, and gave them a starting-point from which to deal with all the difficulties to which they subsequently had to address themselves. In the revenue account, they had received for gas, &c., £2274 more, and for residuals £2806 more. On the other side, coal, oil, and coke had cost them £3973 more. Charges for repairs and maintenance and depreciation had been kept at a healthy figure before attempting to strike a balance. In this connection, it had to be remembered that 6d. per 1000 c.ft. would

barely purchase what 3d. did before the war. Therefore, to secure an equivalent provision as compared with pre-war conditions, it would be necessary to charge practically twice as much as before. If they allowed their works, even at a time like this, to get indefinitely into arrear, a state of affairs would be set up which it would be difficult to remedy later on. The best way was to charge a liberal amount, spend what of it they could at the moment, and definitely assign future expenditure where it was needed to be carried out as opportunity offered. Extraordinary items of expenditure due to the war amounted to something like 3d. per 1000 c.ft. on the price of gas, which in their case was not abnormally high. It was only 3s. 6d.; and, comparatively speaking, their consumers were being treated extremely well. The result of the working, after deducting interest, dividend, income-tax, &c., was a nominal deficit of £331, which was supported by the reserve, insurance, and renewal funds. So far as the present half year was concerned, there had been a small decrease in the output of gas. They had coke and labour difficulties to contend against. Wages had increased by from 60 to 80 p.ct. There had been a proposition that all the gas companies should unite—a thing which he believed they had never done—to deal with this labour problem upon a common footing. While not wishing to discourage any idea of the kind, it did seem improbable that such a huge diversity of conditions could possibly be met by one comprehensive method of treatment. He thought each undertaking would have to deal with its own difficulties. A settlement that would give relief in the case of one set of labour conditions would effect great disturbance under another; and sooner or later they would have to revert to the consideration of the particular conditions at the point at which trouble existed. As gas companies went, the position of their own undertaking was about as stable, sound, and well-calculated to meet future demands as any he knew of. He concluded by moving the adoption of the report and accounts.

The resolution was seconded by Mr. H. A. Lermitte, and carried unanimously; dividends being thereafter declared for the half year, less income-tax, on the preference capital at the rate of 5 p.ct. per annum, on the original ordinary capital 11 p.ct. per annum, and on the additional ordinary capital £7 14s. p.ct. per annum.

Mr. H. F. Lofts and Mr. A. F. Phillips were re-elected Directors. The Chairman, in proposing this, said he had previously referred to the very good manufacturing results of the Company; and it was to Mr. Phillips that whatever excellencies existed—and they were numerous—were due. He had re-designed the works; and they were now enjoying the fruits of his work. The Auditor (Mr. L. Hardy) was also re-appointed.

A cordial vote of thanks to the officers and staff, proposed by the Chairman, was acknowledged by Mr. Lawrie Trewby (the Engineer and Manager) and Mr. Burton. A like vote was accorded to the Chairman and Directors, on the motion of Mr. Thomas Glover, seconded by Mr. A. W. Oke.

HARROW AND STANMORE GAS COMPANY.

Only Two Pence Increase in Price Since the War Started.

The Half-Yearly Meeting of the Company was held last Tuesday, at No. 5, Great Winchester Street, E.C.—Mr. Arthur F. Phillips, M.Inst.C.E., in the chair.

The Engineer and Secretary (Mr. Charles Chambers) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said he had to call attention, as stated in the report, to the continued development in the Company's business; the consumption of gas in the past half year having been 17¼ p.ct. more than in the corresponding previous half year. This had resulted while the Company had been refusing new consumers and not encouraging additional business. The total sale of gas was 201,612,000 c.ft. This considerable increase had taxed the capacity of the Company's plant, which, with the difficulty in obtaining coal and shortage of labour, had thrown great responsibility on the staff, and caused the Directors much anxiety. It was, however, satisfactory to report that the supply of gas was well maintained; and at no time was there any reduction in the pressure at which the gas was supplied. Consumers would, however, be obliged to use less gas. The cost of coal and all other materials required by the gas-works, and the extra payment to the Company's workmen—charges which were continually increasing—were a serious burden. The Directors had so far been able to avoid any further increase in the price of gas; but how long this might be postponed, he was not prepared to say. No one could forecast the future, or the conditions under which coal and oil might be obtained, or what might be the demands of labour—all vitally affecting the cost of gas. It should, however, be a satisfaction to the consumers that the price charged by the Harrow Company for gas had only been increased 2d. per 1000 c.ft. since the war broke out, and remained at 3s. 4d. per 1000 c.ft.

The Accounts.

The capital account showed that, while £1113 had been added for meters and stoves, £2833 had been written off for depreciation; so that, notwithstanding the increase in the sale of gas, the capital expenditure was £1769 less than at June of last year, or £620 per million c.ft. of gas sold per annum. The revenue from the sale of gas was £37,443, against £32,233 in the corresponding half year; and residuals realized £9674, as compared with £6749. Coal, oil, and coke for producing the gas cost £19,612, against £14,428; and carbonizing wages were £1515, against £1114. Repairs of works figured at £4460, against £2948, of which £2200 was in suspense owing to the war. War allowances to employees totalled £1148, as compared with £614; and in addition there was £314 for war service payments. All other charges were much the same as the previous year. The resulting profit was £8334, against £8127. Adding the balance brought forward last half year, £4552, and interest on deposits, £120, to the £8334 profit, and deducting £1882 interest on debenture stock and income-tax, left £11,125 available for distribution. The dividends recommended would absorb £6772, leaving £4352 to carry forward to the next account. The production of gas was 12,134 c.ft. per ton of coal, which was highly satisfactory, considering that 30 p.ct. of water gas was supplied, and the quantity of oil used with it was small. It had been the aim of the Company to maintain the gas of a satisfactory quality.

Meeting Demands All Round.

The increase in the sale of gas to Stanmore and Edgware was 31½ p.ct. This district was farthest from the works; and there had been great difficulty in maintaining the supply. At the extreme end of the Company's limits, there was the Hendon Aviation Ground, which required a considerable quantity of gas. The consumption having outgrown the capacity of the mains, the Directors had put in hand the laying of larger ones for improving the supply, and hoped the work would be completed before the autumn. It would also be necessary to make additions to the plant at the gas-works to meet the increasing consumption. How far permits could be obtained, was not yet settled. Throughout the year, the Company had met the demands of the Government for benzol. The extraction of this from the gas threw considerable additional work on the staff. It required constant watching, and a knowledge of chemistry. The men had fortunately been successful in this work. The process was not a remunerative one for works of the size of those at Harrow. It also increased the liability to the deposit of naphthalene in the services—at times interfering with the supply of the gas to some houses. It was, however, some consolation to know that the work done by the gas companies was appreciated by the Government. The head of the Explosives Department had stated "that without the direct aid of the gas industry, it would have been perfectly impossible for this country to have waged the campaign of the last three years." He (the Chairman) did not think the general public realized the important part the gas companies had taken in the prosecution of the war. If the Company had to bear some loss, and the consumers at times a little inconvenience, they had the consolation of knowing they were helping the country and acting patriotically—as everyone should do, no matter at what cost or inconvenience. Since the last meeting, the Board had appointed Mr. Chambers as Secretary, as they had power to do under their Act. Mr. Chambers was an old official of the Company. Since the death of the late Secretary (Mr. James L. Chapman) he had been acting as Secretary, and had satisfactorily carried out all the duties. He could bear testimony to his devotion to the Company, to the ability he showed in the management, and to the way in which, by his courtesy and consideration, he gave satisfaction to the Company's customers.

Mr. Samuel Cutler seconded the motion, which was agreed to without discussion.

On the proposition of the Chairman, seconded by Mr. A. M. Paddon, dividends were declared for the half year at the rates of 5½ p.ct. per annum on the 5 p.ct. ordinary stock, and 5 p.ct. per annum on the 5 p.ct. preference stock, both less income-tax.

The Chairman, in proposing the re-election as a Director of Dr. J. W. Lee Glaisher, F.R.S., expressed that gentleman's regret at not being able to be present, owing to another important engagement. He was an excellent Director; and his advice was always sound.

Mr. Paddon seconded the motion, which was carried.

The retiring Auditor (Major Charles E. Goddard, M.D.) was also re-appointed, on the proposal of Mr. Charles Fox, seconded by Mr. R. S. Bathe.

A Patriotic Appeal.

The Chairman, at this point, announced that a telegram, on His Majesty's Service, had just been received by the Secretary in the following terms: "Please ask your Chairman to advise shareholders of urgent necessity for investing dividends in National War Bonds during Business Men's Week, March 4 to 9—Retrench." He sincerely hoped the shareholders would do as suggested. The Directors would consider the matter on behalf of the Company later on.

Votes of Thanks.

The Chairman then proposed that the thanks of the shareholders be given to the Secretary and Engineer and the staff, and to all the employees, for the services that had been rendered by them during the past half year. The position of the manager of a gas-works in these days was one of considerable anxiety. There was the difficulty in getting in the supplies of coal and other material required for the production of gas, as well as the trouble of providing the labour and properly controlling it. In all these respects, Mr. Chambers had been most successful, and the staff under him had worked right loyally. He had therefore much pleasure in proposing the vote.

Mr. Cutler, in seconding the motion (which was heartily passed), said that, in choosing Mr. Chambers, they had selected the right man. He had for many years past had plenty of opportunities of judging of Mr. Chambers's ability; and from all he had seen of his daily work, he felt convinced they could not have a better man.

Mr. F. H. Pilley proposed a vote of thanks to the Chairman and Directors; remarking that it was a pleasure to attend meetings of the Company, at which the shareholders invariably received an excellent report of the progress of the undertaking.

Mr. Arthur Valon seconded, and said the Directors were to be congratulated upon the way in which they had got through all the troubles by which they had been beset. The balance-sheet now submitted compared extremely favourably with those of most gas companies. He himself lived not very far from Harrow, and knew something of the difficulties which had had to be overcome; and he felt that the shareholders owed a very deep debt of gratitude to the Board for the manner in which they had conducted the business during the past half year.

The vote was cordially agreed to and suitably acknowledged by the Chairman.

Romford Gas Company's Dividend.—By a slip on the part of a printer last week, the dividend for the past half year on the "B" shares of the Romford Gas and Coke Company, Ltd., was made to read "at the rate of 7⅞ p.ct.," instead of "4⅛ p.ct."

VERTICAL RETORTS FOR BLACKBURN.

£96,000 to be Spent on New Plant.

At the last meeting of the Blackburn Town Council, Mr. E. Hamer, the Chairman of the Gas Committee, referred to the urgent necessity for proceeding with extensions at the Greenbank Gas-Works, and said the Committee recommended the Finance Committee to approve the estimate of £96,000 required for the purpose, and to make application to the Local Government Board for permission to borrow the money.

Dealing with the cost of producing gas by vertical retorts as compared with the existing inclined retorts, Mr. Hamer said that, based on an annual production of 576 million cubic feet, it was estimated that there would be saving in coal alone of £12,343. Wages for carbonizing would be reduced by £3528, and the total maintenance costs by £3600, or a saving of £19,471. If they added the increase from bye-products (£7752), they would have a total saving of £27,223. The net cost for carbonizing per 1000 c.ft. of gas made under the vertical system would be 1s. 0·94d., compared with 2s. 0·28d. at the present time, or a saving of 11·34d. He thought the figures justified the Gas Committee in asking the Council to approve the scheme, in order to bring the gas-works up to date and make them into a sound concern. He had prepared a statement showing the increase in the cost of the maintenance of the existing plant at the Greenbank Gas-Works. In pre-war days, the average cost of repairs and maintenance was £7500; in 1914-5, it was £8566; in 1915-16 (the year that Mr. Morton Fyffe came, and when it was proposed to make extensive alterations), it was reduced to £6886; in 1916-17 the figure rose to £12,903—an increase on normal expenditure of £5403, or 72·4 p.ct.; while in the present year the cost was £16,800—showing an increase over the ordinary cost of £9300, or 124 p.ct. In view of these figures, he thought they were justified in spending money on the works. Mr. Hamer then went on to refer to the proposed increase in the price of gas supplied through slot meters; and he submitted figures showing that the increased cost to supply gas to slot consumers equalled 9·44d. per 1000 c.ft.; the total net cost of 1000 c.ft. of gas sold through ordinary meters being 2·34d., compared with 11·78d. for gas sold through prepayment meters. In face of these facts, they had no alternative but to increase the price to the slot consumers.

Mr. E. Porter (the local Secretary of the National Union of General Workers), after unsuccessfully attempting to get the proposal for increased prices referred back, next moved that the proposals relative to the new vertical installation should be referred back, mainly on the ground that the Council a month ago decided to spend £115,000 on a new electricity station. The two schemes—gas and electrical—represented a total expenditure of £211,000; and he suggested that further inquiry should be made before the vertical installation was decided upon. "At Sheffield and Widnes," he continued, "where horizontal retorts are installed, gas is as cheap as anywhere in the country."

Mr. Hammond said that, when the late Mr. Morton Fyffe was the Gas Engineer, a Sub-Committee (of which the speaker was a member) paid visits of inspection to several towns. They found that wherever vertical retorts had been installed they were far and away superior to the system they had displaced. He could not recall a single instance of a gas manager speaking a word against vertical retorts. The Sub-Committee proved up to the hilt that gas could be made better, cheaper, and under improved conditions for the workmen by this system, which in Blackburn would result in the saving of money.

Mr. Bolton, who also was a member of the Sub-Committee, voiced similar views with regard to vertical retorts.

After some further criticism, Mr. Hamer said the question of retorts was settled a long time since. A Special Sub-Committee was appointed, a number of towns visited, and the Gas Committee were perfectly satisfied when they made their report that it would be the best thing for Blackburn to put in verticals. This was agreed to by the Gas Committee; and had it not been for the war, there was no doubt they would have had vertical retorts in use now. If they went on with the gas-works as they were at the present time, the public would have to pay more for gas.

The amendment was negatived, only four voting for it. The vertical retort scheme and increased prices were then agreed to.

Maidenhead Gas Bill.—The Thames Conservancy Board are petitioning against the Bill which the Maidenhead Gas Company are promoting, as the Parliamentary Committee "view with apprehension the extension of the existing gas-works for the purposes proposed on land in such close proximity to the River Thames." The Corporation of Maidenhead have also petitioned against the Bill, on the ground that the scheme would destroy the amenities of the borough.

A Cool Wages Request.—An extraordinary wages application has, it is reported, been made to the Rochdale Electricity Committee. The grant of 12½ p.ct. bonus to electricity workers was made retrospective from the beginning of October; and several men who had left the service of the department in the interval applied for the 12½ p.ct. from that date until the time when they left to enter other employment. The Committee naturally declined to grant the request.

Wages at Stafford.—Considerable surprise is felt among the members of the Stafford Town Council, at a request which has been received from the Workers' Union for a further increase in the wages of the men employed at the gas-works. Alderman Westhead (the Chairman of the gas undertaking) is somewhat concerned regarding the national movement for another advance in the wages of gas workers; and he feels that if Stafford is included in this movement they would have to conform to the demand despite the recent arbitration which was satisfactory to both parties, and under which a war bonus of 16s. a week was granted to the weekly wage earners, and 2s. 8d. per shift to the shift men at the works. It is thought, however, that the application from the Workers' Union is just a local one; but if their demands are conceded, it will mean an increase in the price of gas.

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TAXATION OF COAL MINES.

Speaking on "The Taxation, Rating, and Valuation of Mines," at the last meeting of the Surveyors' Institution, Captain David Bowen, F.G.S., M.I.M.E., said it was probable that for some years the State might have to resort to heavy and varied forms of taxation in consequence of the present war. Their Institution might, perhaps, be of some assistance in determining what form of taxation, and what amount might fairly be applied to mines, as distinguished from other industrial concerns, without prejudice to their proper development. Very heavy sums had been sunk by way of capital expenditure; labour troubles were constantly arising; engineering difficulties, particularly in connection with concealed coalfields, were becoming increasingly greater; and the ingenuity and resourcefulness of those directing mining concerns were being taxed to the uttermost.

The importance of mining undertakings and mineral properties as sources of revenue, both for imperial and local purposes, could not be over-estimated. The total output of coal in 1913 amounted to about 287,430,473 tons, of the estimated value of £145,535,669. The total population of the United Kingdom in 1911 was estimated at 45,298,573, of whom 1,214,165 were engaged in and about, and working and dealing in the products of, mines and quarries. Of these, the bulk were engaged in and about coal mines. The total revenue from income-tax in the year 1913-14 amounted to £47,240,771. The gross amount of income from mines assessed for this tax in the same year amounted to £19,611,489. While the total population of the United Kingdom had increased during the period 1901-14 by about 12 p.ct., the revenue derived from income-tax had increased by 34 p.ct., and the gross amount of income from mines assessed for income-tax had increased by about 11 p.ct. One of the grievances of mine owners was that there was no uniformity in the system of valuation for rating throughout the country. Again, it was a well-known fact that collieries within the same district often differed considerably from the point of view of natural advantages. The output of coal and the selling price per ton might be for all practical purposes equal in the case of two collieries; yet, through the presence of a few important faults in one and the absence of faults in the other, the one had considerably higher working expenses to be taken into account as compared with the other. Appeal on the ground of excessive assessment would involve the disclosure of information which no mine owner would ordinarily care to contemplate.

The tendency of the modern colliery was to recover more of the ultimate value of coal at the pit-head; and it was a well-known fact that the more this was done, the more did profits increase compared with the previous system. He was speaking more particularly of the tendency to install at every modern colliery, where it was possible, bye-product plant. Of course, the installation of such plant involved great increase in capital expenditure; and this meant that, out of their annual gross receipts, they had to put aside more towards the redemption of the increased capital expenditure. But he had known personally from his own experience some cases where a bare profit had been turned into a very considerable one by the simple introduction of bye-product plant in this way. As against this, of course, they had to contend with increased wages of miners, and possibly shorter hours.

CO-PARTNERSHIP BONUS AND DIVIDEND.

Identical Interest in the Gas Light and Coke Company.

Following upon a report of the proceedings at the recent general meeting of proprietors, the "Co-Partners' Magazine of the Gas Light and Coke Company" makes the brief statement given below on the subject of the re-settlement of the co-partnership bonus.

This liberal act on the part of the Directors amounts to a re-birth of the Company's co-partnership, which will henceforward have a logical and, so to speak, a natural financial basis. Instead of the amount of the bonus being governed by the price of gas according to the scale provided by the rules, it will in future be the same as the rate of dividend payable for the time being on the ordinary capital stock of the Company. That is to say, the amount of a co-partner's wages will be treated as so much capital invested in the Company's undertaking, on which he will receive dividends at the same rate of interest as that paid on the shareholders' capital. Therefore, the interest of the co-partners and the proprietors of the Company will be identical.

This we believe to be the first time such an arrangement has been adopted by any employer of labour, at any rate in this country, with joint-stock capital. It not only restores a bonus to co-partners deprived of it under the old scale, but ensures the continuance of the co-partners' share in the Company's profit so long as the holders of stock get any, and to an equal amount. That the Directors should have carried out this reform of the whole constitution of the co-partnership scheme at this time, when the finances of the Company are being subjected to an unexampled strain, witnesses to their present courage and faith in the future, as well as to their statesmanlike spirit in giving a lead through the industrial perplexities of the period.

A Loss at Dover.—The abnormal time through which the country is passing has evidently had a more than usually severe effect on the Dover Gas Company; for at the half-yearly meeting yesterday the Directors had to report with regret that the anticipation expressed at the last meeting has not been realized. The working for the past half year has, for the first time, resulted in an actual loss of £228. The Directors therefore recommended a dividend for this period at the rate of 5 p.ct. per annum, less income-tax. This will exhaust the undivided profits, and will necessitate the withdrawal of £669 from the reserve fund. The cost of all material and labour, they pointed out, has continued to advance at an alarming rate; and though the use of the railway siding has resulted in some saving in the cost of handling rail-borne traffic, they had no option but to again increase the price of gas as from the beginning of this year.

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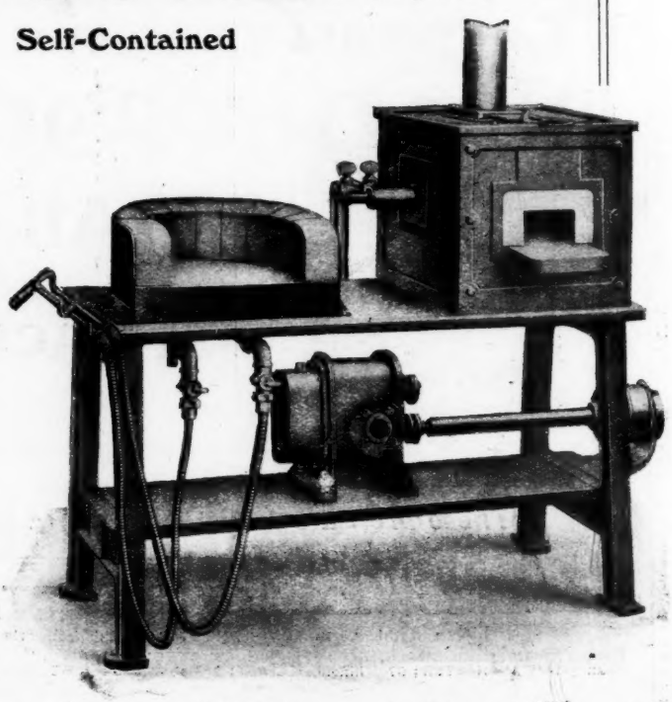

EXPERIENCES OF GAS AND ELECTRIC COMPANIES.

"Common Justice" Claimed for Gas Shareholders.

The following remarks, contrasting the financial experience of electricity companies with that of the gas undertakings, appeared in "The Times" last Saturday:

Most of the electric lighting and power companies have now declared their dividends for the past year, and in the subjoined table a comparison is made of the distributions to shareholders during the past five years, which cover the period of hostilities and the last pre-war year:

Company.	1917.	1916.	1915.	1914.	1913.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Bournemouth . .	6	6	6	7	7
Central Electric . .	nil	nil	nil	5	5
City of London . .	8	8	8	9	10
County of London .	7	7	7	7	7
Kensington and Knightsbridge . .	7	6	7	9	9
London Electric . .	5 on pref., nil on ord.	4 on pref., nil on ord.	3*	4*	3*
Metropolitan . . .	4	3	3	3½	4½
Newcastle-upon-Tyne	8	7	6	5½	5½
Notting Hill . . .	300	300	500	500	500
Oxford	5	5	6	6½	7
St. James' . . .	9	8	8	10	12
South London . .	5	5	5	5	5½
South Metropolitan .	6	4	4	nil	nil
Westminster . . .	9	7	7	9	10

* On ordinary.

It will be seen that of the 14 Companies included, 11 Companies have on account of the past year made smaller distributions than in 1913; while only two have been able to increase their dividends. The other Company—the County of London—have paid 7 p.ct, regularly throughout the period. But as compared with last year, seven Companies have increased their distributions, and the others have maintained the return to shareholders at the level of 1916. These fluctuations in dividend fairly reflect the general experience of electricity undertakings. Generally speaking, the amount of electricity sold last year was increased, and the percentage increase in quantity represents in some cases, approximately, the increase in profits. Thus the Kensington and Knightsbridge Company, whose report was issued yesterday, sold 10 p.ct. more electricity last year, and its profits were increased in almost exactly the same proportion. In the autumn of 1916, all the London undertakings increased their charges by 10 p.ct.; but this raising of the price was, apparently, not much more than sufficient to meet the increased cost of supply due to war conditions. Since then, however, a further increase has been made in charges generally; and this will be reflected in this year's accounts. But it is pointed out that the Government bonus of 12½ p.ct. recently granted to skilled time workers will largely increase expenses this year.

But despite the fact that the electricity companies are generally paying smaller dividends than before the war, their position appears by comparison with their competitors—the gas companies—a very prosperous one. The comparison demonstrates the unfair advantage which the electricity undertakings have over their competitors by reason of the fact that, unlike the gas companies, they are not subject to a sliding-scale arrangement by which dividends are raised or reduced as the price of gas is lowered or increased. The gas companies have had their expenses largely added to, and, in common with the electricity companies, have had to increase their charges. But each increase has involved a reduction of dividend; and this process has now reached such a point of absurdity that the companies have decided to go to Parliament to obtain power to vary the sliding-scale arrangement, which will enable them to pay nearly, if not quite, the same rates of dividend as before the war. The Gas Light and Coke Company has since the war had to reduce its dividend from £4 17s. 4d. p.ct. to £3 14s. 8d. p.ct., and in the current half year the dividend will be only £2 18s. 8d. p.ct.; the Commercial Gas Company has had to make a reduction from £5 6s. 8d. to £3 13s. 4d.; the South Metropolitan dividend is now £4 p.ct. instead of £5 9s. 4d.; and the South Suburban £4 6s. 8d. p.ct., against £6 p.ct. In common justice, shareholders in gas companies ought to be placed in a position of approximate equality with the shareholders in electricity undertakings, since they both provide an analogous form of public service.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 11.

The market for pitch continues firm, and the price of the article is well maintained. Shipments are being made regularly. There is a considerable amount of inquiry for solvent naphtha; the price being firm at from 4s. 3d. to 4s. 6d. per gallon net into buyer's packages at makers' works. Supplies are, however, very scarce. A fair amount of business is being done in creosote and other tar oils on the basis of the price arranged by the Government.

In sulphate of ammonia there is nothing new to record.

Tar Products in the Provinces.

March 11.

The average values for gas-works products during the week are: Gas-works coal tar, 27s. 6d. to 31s. 6d. Pitch, East Coast 20s. to 25s. per ton; West Coast—Manchester 18s. 6d. to 19s. 6d., Liverpool 19s. 6d. to 20s. 6d., Clyde 19s. 6d. to 20s. 6d., nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7⅞d. to 8⅛d. Solvent naphtha, naked, North, 3s. 10d. to 4s. Heavy naphtha, North, 2s. 3d. to 2s. 6d. Creosote, in bulk, North 4d. to 4¼d. Heavy oils, in bulk, North 4¼d. to 4½d. Carbolic

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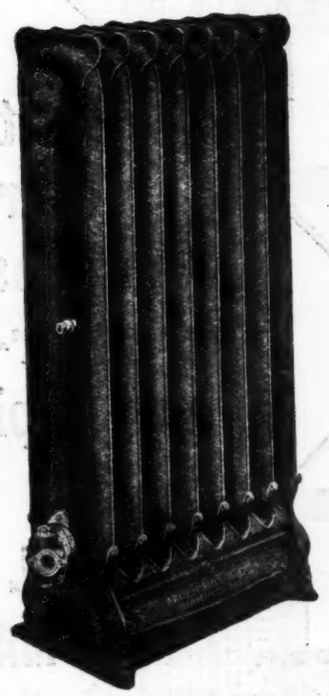
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acid, 60 p.ct. East and West Coasts, 3s. 4d. naked. Naphthalene salts, 90s., bags included. Anthracene, "A" quality, 4d. to 6d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

General conditions remain without much change, and are considered satisfactory. The foreign demand for pitch continues very heavy, and only the unfortunate scarcity of tonnage prevents a much larger business from being done. London prices are a little dearer—50s. to 52s. representing the f.o.b. value. East Coast rates are unaltered. For home uses, even Manchester prices are higher, at 24s. per ton, and some sellers have asked more than this, which suggests a hopeful outlook for future business. As regards tar, distillers have as yet received no specifications as to prepared tar for road purposes. Quotations are without material change. The position of the naphthas is without further development. Quotations are very firm. Although rumoured, there is no news as to fixed prices; and the better informed section of markets now believe that, so long as quotations do not go beyond present level, no further regulations will be issued. Naphthalenes show no alteration. Refined sorts are steady at £30 to £32 10s. per ton. Crudes still meet a good demand at from £7 to £15 per ton, according to quality, which is worth noting in view of the expected falling off in the demand from the firelighter industry at this period of the year. Government orders absorb the bulk of creosote and heavy oils produced. Cresylic acid is up to 3s. 6d. per gallon, casks included; and aniline oil is dull at 1s. 3d. per lb.

The range of quotations is as follows:

Aniline Oil (pure): 1s. 4d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 32s. 6d. to 35s., Midlands 27s. to 29s.; North 28s. to 30s. per ton, *ex* works.

Pitch: London 48s. to 50s. f.o.b.; East Coast, 26s. to 28s. f.o.b.; West Coast—Liverpool 22s.; Manchester 24s. f.a.s.; Clyde 27s.

Solvent Naphtha: Naked London 90-190% 3s. to 3s. 3d.; North 2s. 9d. to 3s. per gallon; 90-160% naked London 4s. 3d. to 4s. 6d.; North 4s. to 4s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 4d. to 4½d. (Government price, 7½s. per ton f.o.b.—equal to 4½d. per gallon); heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included, *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

There is practically no fresh development to report. All available supplies for the season appear to have been taken up, and fresh orders can only receive indifferent attention. Deliveries are much in arrear, in spite of makers' endeavour to operate to full capacity. The export trade is quite finished for the present, and no developments are looked for until next year. Makers are interested in reports that encouraging progress continues to be made in connection with the synthetic production of ammonia, and are hoping that details of the process being followed may be communicated to them. Extensive developments are likewise proceeding in the United States; and it is interesting to note that the only hydro-electric nitrogen fixation plant in actual operation in all America is situated at the Niagara Falls, Ontario, Canada. The fixed nitrogen is converted into cyanamide, which is exported to the United States to the extent of 64,000 tons per annum.

Increased Business at Tunbridge Wells.—At the fifty-fourth annual general meeting of the Tunbridge Wells Gas Company, over which Alderman W. H. Delves, J.P., presided, the report presented showed that, after the payment of an interim dividend at the rates of 11¾, 9¼, and 8¾ p.ct. per annum on the respective stocks for the half year, together with the interest on the debenture stocks and temporary loans to Dec. 31 last, a balance of £13,245 remained unappropriated, out of which the Directors recommended a dividend for the past half year at the rate of 11½ p.ct. per annum on the consolidated ordinary stock, 9 p.ct. per annum on the consolidated "B" stock, and 8½ p.ct. per annum on the consolidated "C" and "D" stocks. This would absorb a sum of £4212 (after deduction of income-tax), leaving £9032 to be carried forward. The sale of gas showed an increase of 14·70 p.ct. over the corresponding period. The Chairman referred to the war-time difficulties, especially with regard to the cost and supply of coal. The cost of carbonizing materials had gone up by £10,600; but this was counterbalanced by an increase of £10,600 in the revenue from the sale of gas. With some 14 p.ct. increase in consumption, there was naturally an increase in expenses—the quantity of coal used being 27,958 tons, as compared with 23,000 tons the previous year. The profit had increased by £2381, which enabled the dividends and interest to be paid, with the exception of about £100, without having to draw from the balance carried forward. The report and declaration of dividend were unanimously adopted. At an extraordinary general meeting which followed, resolutions were carried authorizing the Directors to increase the capital stock of the Company by the creation of £10,000 of consolidated "D" stock, when necessary, and pay an interim dividend in August each year, in respect of any half year ending June 30, without convening a meeting of the proprietors.

East Grinstead Gas and Water Company.

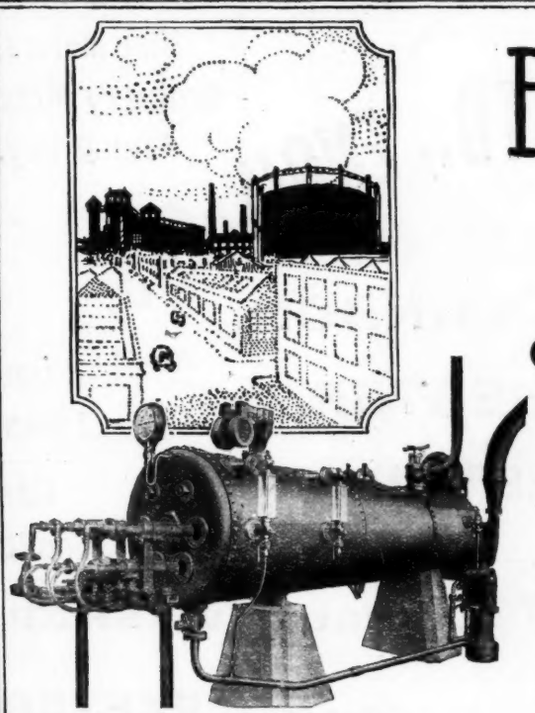
The report presented at the ordinary general meeting of the Company, over which Mr. P. E. Wallis (the Chairman) presided, showed that the receipts from gas-rentals in 1917 amounted to £9920; from residuals, £3067; and from water, £4270. The accounts showed an available balance of £8037, from which the Directors recommended a dividend of 9 p.ct. on the "A" stock and "A" shares, and of £6 6s. p.ct. on the "B" and "C" shares (less income-tax). Interim dividends of £3 10s. and £2 10s. p.ct. respectively had been paid; so that £5 10s. and £3 16s. would be payable now. This would absorb the sum of £2735, leaving a balance of £5303 to carry forward, or £100 less than last year. It was stated that the increased cost of coal and materials in general made it probable that the next year would be adversely influenced to such an extent that the Company might be compelled to increase the price of gas. The detailed accounts showed an expenditure of £8723 on the manufacture of gas (including £7002 for coal), £675 for distribution, and £730 for management; other items bringing the total expenditure to £10,462. The income amounted to £12,968—£6000 from ordinary customers, £3062 from automatic consumers, and £3067 from residuals. During the year 4347 tons of coal were consumed. There were 437 tons of coal in store at the end of the year, against 1014 tons at the beginning. The expenditure in respect of water was £1744, including £1285 for maintenance, and £460 for management. The receipts were £4287. Gas had been in great demand, and, unlike many districts, there had been no restriction in the general supply, which was a matter of general satisfaction. This was shown by an increase of £2045 in the sales of gas, largely due to the very extensive adoption of the use of gas-fires—over 130 additional fires having been fixed during the year. Residual products were the same as last year; for while coke, owing to the large quantity of coal used, showed an increase of £200, tar and sulphate of ammonia were less. East Grinstead consumers were having their gas at the same price as it was being supplied in the greater portion of London, notwithstanding the fact that the carriage of coal from London to East Grinstead was 4s. 4d. per ton, and notwithstanding the advantages in London of the making of gas on a large scale. Mr. Donaldson, in seconding, remarked that if the price of gas had to be increased the blame for it would rest with the Coal Control Board, and not with the Company. The motion was carried.

Carbonizing Plant Extensions at Blyth.—Extensions to the carbonizing plant of the Blyth Gas Company are now in a more forward state; and the Directors have assurances that the plant will shortly be in operation. The profit of the Company for the past year amounted to £3996, out of which it was agreed to pay the maximum dividend of 6½ p.ct. for the year, less income-tax. The revenue account showed an increase in receipts, when compared with the previous year, of £1624, and an increase in the expenditure of £3050.

Reading Gas Company.

It was stated by the Directors in the report which they submitted at the annual meeting of the Company that the circumstances of the past year had involved great difficulty and anxiety, largely owing to the increase in the cost of labour and materials required for the Company's use, and to Government requirements and restrictions. In addition to this, the effects of time had shown themselves in many branches of the Company's works, some portions of which dated from 1870, and others from 1881. Further, the make of gas had increased beyond all anticipation—viz., from 732,023,000 c.ft. to 867,750,000 c.ft.—since the last pre-war year. It had become evident, therefore, that large renewals and considerable extensions to the works and plant of the Company were imperative, and that provision should be made for a considerable expenditure for both purposes. The Directors had consequently deemed it prudent to raise the price of gas at Lady Day. The accounts showed that the income for the year was £171,646, and the expenditure £153,773, leaving a balance of £17,873 to go to the profit and loss account. The Directors recommended the payment of dividends for the past six months at the rate of 5 p.ct. per annum on the preference shares and ordinary stock; interim dividends at this rate having been declared for the first half of the year. The Chairman (Mr. J. Okey Taylor) pointed out that, as stated in the report, forty years had elapsed since the existing plant was installed; and the works were suffering to a considerable extent from wear and tear, and becoming unequal to the demand for gas. About this time last year, the Engineer (Mr. Douglas H. Helps) presented a report to the Directors, in which he emphasized the necessity of renewing a large portion of the works and of making considerable extensions thereto. Since the report was presented, a portion of the plant had developed further signs of hard wear. The Directors therefore came to the conclusion that it was absolutely necessary to raise the price of gas from Lady-Day last to 3s. per 1000 c.ft. Even at 3s., the present price was a low one. In the midst of all their difficulties, the Aldershot Lighting Company were promoting a Bill in Parliament with the object of obtaining powers to supply a district which the Reading Gas Company were already supplying, and other districts which were much nearer to Reading than to Aldershot. During his long experience, this was the first time any other company had tried to encroach on territory reasonably belonging to the Company. Consequently, in self-defence, they had been forced to petition Parliament against the Aldershot Bill. It was now costing something like 1s. per 1000 c.ft. extra to produce gas as compared with pre-war days. On the other hand, they had a great deal on which they could congratulate themselves. The sale of gas had increased since the last pre-war year by 128,000,000 c.ft.; and even during the past year the increase amounted to 53,000,000 c.ft.

The Morecambe Gas Committee have advanced the price of gas by ordinary meter 3d. per 1000 c.ft., as from April 1, and have fixed an additional rent of 1s. per quarter on slot-meters.



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Gas Profits and the Rates.

Mr. Alfred J. Pennington writes as follows to the "Manchester Guardian:" The Trading Profits Sub-Committee have reported to the Manchester City Council; and shortly they will have to decide if the old system of discouraging the use of gas by compelling contributions to the city rates which are not operative in the case of coal consumers is to be continued. A new aspect of the subject has been presented. In your report of the President's Address to the Manchester District Institution of Gas Engineers, attention is directed to the enormously extended uses to which gas has been applied in engineering works practice. I may state that wide application has been made, too, in the chemical industry, largely with a view of expediting "the delivery of the goods," as ordinary steam-heated appliances take an unconscionably long time to get. It is obviously to the public advantage that gas should continue to supplant coal in both commercial and domestic uses, if only from the point of view of atmospheric pollution. To illustrate the last point. The present coal consumption in Manchester and Salford is estimated at 10,000 tons a day. This coal contains from 1 to 2 p.ct. of sulphur. If we assume that the oxides of sulphur produced by combustion are only passage products, and that the sulphur resolves itself into sulphuric acid, it means that over 350 tons of sulphuric acid are generated daily in our midst. Therefore one asks that our Corporation shall do all that they possibly can to render cheap gas available to domestic and commercial users alike.

Gas for Local Industries.—The Halifax Corporation Gas Committee have decided to recommend that, "with a view to encourage local industries and the fullest use of gas for trade purposes at the termination of the war, when gas charges are reviewed, if it should be possible to reduce the prices to gas consumers, then equal reductions of 1d. per 1000 c.ft. should be made to all classes, until the basis of prices current in November, 1917, is reached." The Committee have further decided that the price of gas be increased 4d. per 1000 c.ft.

Derby Gas Shareholders and Corporation Members.—A very important question has arisen at Derby as to the correct interpretation of the Municipal Corporations Act, in connection with the ruling of the Mayor, that members of the Council who are shareholders in the Derby Gas Company were prohibited from taking part in any discussion of a proposed agreement with the British Cellulose Company for the supply of electricity. The matter was raised at the last meeting of the Council, on Wednesday, when Mr. Linnell asked how it was that no report had been received in respect to Alderman Hart's resolution in October regarding Counsel's opinion being taken on the subject. The Mayor said that a reply had been received from Counsel; but it was so incomplete that they were obtaining further particulars. Mr. Linnell pointed out, however, that the decision was arrived at five months ago; and Mr. Waterson asked whether it was a fact that Counsel's opinion was against the Alderman. The Mayor replied that the matter was not settled yet.

Hartlepool Gas and Water Company.

Mr. J. S. Appleby, presiding over the annual meeting of the Company (at which a dividend was declared at the rate of 5 p.ct. per annum, less income-tax), said the balance-sheet showed a total profit for the year of £33,763, which admitted of the payment of the dividend, and the placing to reserve of £2000 for the renewal of worn-out retorts and machinery. Certain renewals to plant were of necessity postponed until the termination of the war; and it is very desirable to provide as far as possible for meeting the expenditure which would then be incurred. The carry-forward was increased by £1869; but it was still some £6683 less than at the commencement of the war, owing to the fact that the profits were not sufficient in 1915 and 1916 to pay a 5 p.ct. dividend, and reserves were drawn upon to meet the deficiency. On the gas revenue account, the principal item of increased expenditure was that of coal, oil, &c.—an increase of £5186, due to manufacturing 47,738,000 c.ft. more gas, and to the increases in the cost of coal and gas oil. The increase of 2s. 6d. per ton in the price of coal would, of course, affect the present year's working much more seriously—probably increasing costs to the extent of £3500 as compared with the year just ended. It might be of interest to give the increase in current costs, compared with those obtaining at June 30, 1914: Coal, 44·28 p.ct.; gas oil, 276 p.ct.; labour, 49·2 p.ct.; materials for repairs and upkeep, 56·6 p.ct.; while, as an offset, residuals yielded only 13·9 p.ct. more. The war bonus paid during the year amounted to over £4000; and though a further bonus of 5s. per week was granted last month, the Directors now had another application for a very substantial increase. Taking the residuals as a whole, they returned 60 p.ct. of the cost of the coal and oil, as compared with 70 p.ct. in the last normal year before the war.

Labour Troubles at Doncaster.—The Doncaster Corporation employees of practically all departments, who are members of the National Amalgamated Union of Labour, last week gave seven days' notice of intention to cease work unless their demands for a further 8s. per week for men over eighteen, and 4s. per week for youths, are conceded. They have rejected an offer of 3s. The Corporation have referred the matter to the Committee on Production. About 250 workers are concerned.

Ilkley Strike Ended.—The strike of men of the gas and other departments at Ilkley, which has been in operation since Jan. 25, came to an end last Wednesday, when the men resumed work on an agreement that the question of wages be submitted to arbitration. Men who were discharged by the Council prior to the dispute have been reinstated, replacing certain men who, since going on strike, have got work elsewhere, as a result of which the Council consider that the necessity for a reduction of staff no longer exists. An allegation that the discharged men were victimized by the Council has been withdrawn.

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John Street, Booth Street West, MANCHESTER, S.W.

Tynemouth Gas Company.

The annual meeting of the Company last Wednesday was presided over by Mr. J. B. Williamson, who moved the adoption of the report, which stated that there was a balance of profit of £8467 on the year's working. There was an available balance of £14,095; and the payment of a dividend at the rate of 5 p.ct. per annum, less income-tax, on the consolidated and new ordinary stock, would leave a balance of £4437 to carry forward. The number of ordinary and prepayment meters in use at Dec. 31 was 23,106—being an increase of 126. The price of gas to ordinary consumers has been increased 3d. per 1000 c.ft., as from Jan. 1, making the present charge 2s. 9d. It was added that the Directors and shareholders alike have to regret the great loss sustained by the death of the late Manager and Engineer, Mr. William Hardie, who faithfully served the Company for 39 years. The vacancy has been filled by the appointment of Mr. F. C. Willis, who has been Assistant Engineer to the Company for the last ten years. Owing to the death of Mr. Hardie, the new Bill, which had received the sanction of the shareholders, has been withdrawn from this session of Parliament. The Chairman remarked that, should further advances take place in the cost of coals and wages, it would be impossible to avoid another addition to the price of gas later in the year. The revenue for the twelve months was £111,645, and the expenditure £103,178, leaving a balance of profit which was less by £1190 than was needed to pay the statutory dividends. This amount had been taken from the balance brought from the previous year. The revenue from gas and residuals showed satisfactory results. The report was adopted; and the statutory dividends were declared. Referring to the loss of Mr. Hardie, the Chairman said: "Owing to the lamented death of our Engineer and Manager, Mr. William Hardie, a familiar figure is absent from the meeting to-day. So far as I know, Mr. Hardie was not absent from an annual meeting during the whole period of 39 years in which he served the Company. The Directors have lost a trusted and valued friend, and the shareholders a faithful servant. The 'new works,' as they are still called, were designed and erected under his personal direction and supervision, and stand to-day a fitting monument to the quality of his work and to his ability as an engineer. Mr. Hardie was eminently a safe man; and under his fostering care the Company of which he was so justly proud has had a steady growth through all these 39 years."

The Welsbach Light Company, Ltd., have taken up £10,000 in War Bonds, in connection with last week's campaign, and also 1250 War Savings Certificates for employees, to be purchased by weekly payments at a discount of 6d. each certificate, besides enabling them to participate in the St. Pancras Borough prize bond scheme. The Company already hold £45,000 in War Loan; and they have previously taken up 2050 certificates for distribution among their employees, who have purchased them by weekly payments at a discount of 6d. for each certificate.

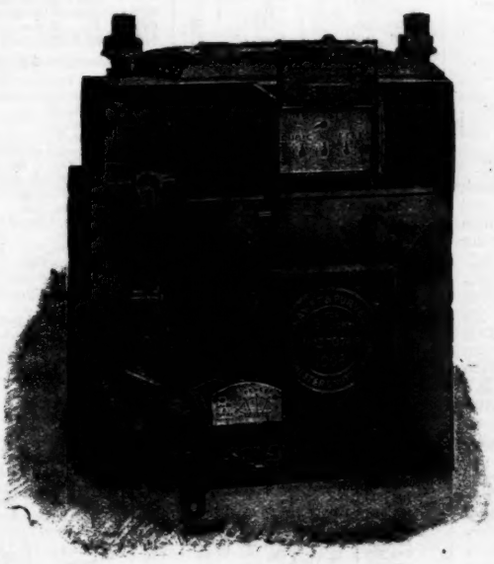
Proposals to Close-Down during Summer.—The Local Government Board for Ireland have forwarded to the Limavady (co. Londonderry) Urban Council a memorial which they had received in protest against the Council's recent decision to discontinue the manufacture of gas during the six months in which the Summer Time Act would be in operation. It was desired to know the reasons for this decision. After consideration, it was resolved to submit to the Board a full statement of the memorialists' relationship to the gas concern, and a financial statement in justification of the Council's action. The Tandragee (co. Armagh) Council also discussed the advisability of closing-down the gas-works during the summer months; but several members expressed the opinion that gas would be required, owing to the scarcity of paraffin.

Woking District Gas Company.—The Directors were in a position to report at yesterday's half-yearly meeting of the Company that, for the six months ended Dec. 31, the receipts from the sale of gas showed an increase of 28·43 p.ct. over the corresponding period of 1916, and residual products an increase of 56·12 p.ct. The revenue was £14,381, and the expenses on revenue account £11,641, leaving a net profit of £2740, to which had to be added the balance of £1815 brought forward. After meeting the usual interest charges, &c., and writing off £500 part cost of the Special Act, there remained an available balance at the credit of the profit and loss account of £3596. The Directors recommended the payment of dividends on the preference stock of 5 p.ct. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ p.ct. per annum, which would absorb £1739, leaving £1857 to be carried forward.

A Trying Year at Tonbridge.—The past twelve months witnessed increased sales of gas to the extent of 16¼ million c.ft. by the Tonbridge Gas Company; but in consequence of the further rise in the price of coal and other materials, it was found necessary to raise the price of gas 3d. per 1000 c.ft. from the beginning of this year, causing a reduction of ¾ p.ct. in the dividend. At the annual meeting, dividends for the past six months were declared at the rates per annum of 12¼ p.ct. on the "A" stock, 9¾ p.ct. on the "B," "D," and "E" stocks, and 5 p.ct. on the "C" stock—leaving a balance of £3794 to be carried to the next account. The Chairman (Mr. William Judd) pointed out that they had barely earned their dividend for the year, owing almost entirely to the increase of 2s. 6d. per ton in the price of coal. However, the 3s. per 1000 c.ft. at which the price of gas now stood compared very favourably with charges elsewhere in the South of England. The Directors had approached the Minister of Munitions last year for authority to erect a coal-hopper, with elevator and conveyor and duplicate charging machinery. These were really necessary in case of a breakdown; but the application had been refused, owing to the great scarcity of materials. Mr. J. Donaldson (the Engineer and Manager), who, as Managing-Director, seconded the adoption of the report and accounts, said he did not look forward to the current year with any pleasure at all. Everything seemed to be against them; but they must continue to do their best.

MILES PLATTING,
MANCHESTER.

SAWER
and
PURVES.
(BRANCH OF METERS, LTD.)



PREPAYMENT
METERS.

RADFORD ROAD,
NOTTINGHAM.

AGENT FOR SCOTLAND
JNO. D. GIBSON,
2, Causeyside St.,
PAISLEY.

British Chemical Trades Association.—The British Chemical Trades Association has just been formed for protecting and promoting the interests of the British chemical industry and the efficient handling of present and post-war problems connected with the trade. A Provisional Committee has been appointed, with Mr. William Mann as Chairman. The Hon. Secretary is Mr. S. J. C. Mason.

Winchester Water and Gas Company.—At the half-yearly meeting of the Company, it was reported that the available balance of the net revenue account for the six months to Dec. 31 was £8733; and the Directors recommended the payment of a dividend on the preference stock at the rate of 4 p.ct. per annum and on the consolidated ordinary stock at the rate of 4¼ p.ct. per annum—less income-tax. The Directors recorded with deep regret the death of Mr. W. Thorn Warren, the Deputy-Chairman, who had been a Director for 23 years, and whose advice and business experience had been of great service to the Company. There had during the half year been an increased demand for gas for the purposes of heating and cooking. At the same time, consumers were reminded that, owing to the shortage of coal, the Coal Controller was urging that wherever possible gas coke should be used for heating and cooking. Owing to the continually increasing difficulties, it has again been impossible to execute the usual and proper repairs at the works; but provision has been made for them.

An Increased Output at Southgate.—As compared with the six months ended Dec. 31, 1916, the sale of gas by the Southgate and District Gas Company increased during the final half of last year by just over 16 p.ct., and the revenue from the sale of residual products by £1796. After providing for interest charges, &c., there remained a balance of profit of £6095, out of which dividends at the maximum rates were declared, leaving £1770 to be carried forward.

Co-operation in the Dye Industry.—Addressing the shareholders at the meeting of the Bradford Dyers' Association, Mr. M. S. Sharp (the Chairman) said it appeared to him they could only hope successfully to contend against the enormous resources of the German industry within a reasonable time by invoking the aid of the great alkali and gas companies, many of whose manufactures were vital to colour production. With the wholehearted co-operation of such powerful organizations as Brunner Mond, Castner-Kellner, the United Alkali Company, the Gas Light and Coke Company, the South Metropolitan Gas Company, and others, the difficulty of securing the necessary financial strength would disappear, and colour-makers would be left free to utilize all the capital they could command for what was their proper field of activity—the production of colours. What was needed above all was something of the impelling force which they had seen in the production of high explosives and other munitions of war.

STOCK MARKET REPORT.

THINGS on the Stock Exchange last week were much the same as they have been for some two or three weeks past. At every centre extreme quietude was the rule, and a dead flat level of dulness reigned throughout in pretty well every market. This perhaps was not to be wondered at, for all London, high and low, was being worked up to a pitch of popular excitement by the invasion at several strategic points of the Tanks engaged in War Bond operations.

In the gilt-edged market, Home Government issues held up for awhile. Most of the War Loans and Consols were firm; but they gave way at last. In Home Rails, the tendency was very similar; being quite steady the first half of the week, but failing to maintain it to the end. Argentines were cheered a bit by good traffic returns; but uncertainties lying ahead of them caused uneasiness.

In the Foreign Market, there was much perturbation, impelled by the tremendous events now being enacted in the East. The nature and the extent of the action which Japan may take defy forecast; and her Government issues were very weak. As to Russian securities—or what used to be such—the market was purely nominal. French, Chinese, and other lines were also clouded with dulness. The Miscellaneous group had fewer redeeming points than usual. Oils did pretty well on the whole; but Rubbers were quite down. There was some weakness in Shipping lines, and Breweries continued flat.

Business in the Gas Market showed some improvement, but not much, in point of volume of transactions over the week before; and there was a rather wider distribution of them among the array of undertakings. Changes in price were very slight and were somewhat irregular and capricious. Variations in quotation were similar in character. Cape Town preference, Gas Light ordinary, Imperial Continental debenture, and Tynemouth were slightly higher; and European, Imperial Continental, and South Metropolitan were slightly lower.

In the Money Market, rates were variable.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 52½, 53, Commercial 4 p.ct. 68, ditto 3½ p.ct. 62½, 63, ditto debenture 52½, European 8⅜. Gas Light ordinary 63½, 63⅝, 63⅞, 64, 64¼, ditto preference 69⅝, 69⅜, ditto debenture 56¼, Imperial Continental 88, 88¼, Lea Bridge 83½, 84, Primitiva 35s., South Metropolitan 70. On Tuesday, Alliance and Dublin 52⅝, 52⅞, Aldershot 5 p.ct. maximum 68⅝, 69, European 8½, 9, Gas Light ordinary 63⅝, 63¾, 64, ditto preference 70, Sheffield "A" 178½, ditto "B" 178½. On Wednesday, Bombay 5 1/16, Bournemouth "B" 10 7/16, 10½, Commercial 4 p.ct. 68½, Imperial Continental debenture 66, 66¼, South Metropolitan 70, ditto preference 94, ditto debenture 55⅜, 56, South Suburban 73½. On Thursday, Cape Town preference 7 1/16, 7⅜, European 8 3/16, 9, 9⅛, Gas Light ordinary 63½, 63¾, 64, 64¼, ditto maximum 56, ditto preference 70, Imperial Continental 87½, 88, ditto debenture 66, 66¼, Primitiva 35s., ditto preference 55s., South Metropolitan 70, 70½. On Friday, Brentford "A" 77, 77⅜, European 9, Gas Light ordinary 63½, 63¾, 64, 64¼, ditto maximum 56½, Imperial Continental debenture 66¼, 66½, Monte Video 8, South Metropolitan 69, 70¼, Walton-on-Thames "A" 12½, ditto "B" 8¾.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55—60*	..
1,551,868	"	April 8	2½	4⅜	Alliance & Dublin Ord.	59—64	52—57	52½—53
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	53—63	..
280,000	5	April 29	7½	3/6	Bombay, Ltd.	5⅞—6⅛	5—5½	5 1/16
50,000	10	Feb. 26	16	13%	Bournemouth Gas and Water { 10 p.c.	29—30	22—24*	..
888,110	10	"	7	7%	Bournemouth Gas and Water { B 7 p.c.	15—15½	10½—10⅝*	10 7/16—10½
115,000	10	"	6	6%	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	9—9⅜*	..
159,740	—	—	—	4%	Bournemouth Gas and Water { 4 p.c. Deb.	..	67—69	..
999,045	Stk.	Feb. 26	14	14%	Brentford A Consolid.	261—266	76—79	77—77⅜
794,920	"	"	11	4⅜%	Do. B New	204—209	73—76	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	79—84	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	63—65	..
217,380	"	Feb. 26	11	9%	Brighton & Hove Orig.	208—213	145—150	..
244,300	"	"	8	6⅔	Do. A Ord. Stk.	154—159	98—103	..
530,000	20	Mar. 26	12½	22/6	British	44—45	32—33	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	2½—3½	..
100,000	10	—	—	4⅜%	Do. 4½ p.c. Pref.	4—6	6⅞—8	7 1/16—7⅞
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,513,380	"	Feb. 12	5/9/4	41/4	Commercial 4 p.c. Stk.	106—108	68—70*	68—68½
560,000	"	"	5½	36/8	Do. 3½ p.c. do.	103—105	62—64*	62½—63
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	52½
800,000	"	"	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	155—165*	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	8½—9½	8½—9½
16,298,975	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord.	98—102	63—65	63½—64½
2,600,000	"	"	3½	3½%	Gas Light and Coke { 3½ p.c. max.	76—79	55—57	56—56½
4,062,325	"	"	4	4%	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	69—71	69½—70
4,674,850	"	June 11	3	3%	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	55—57	56½
130,000	"	"	10	10%	Gas Light and Coke { 10 p.c. Bonds	..	..	..
258,740	"	Mar. 12	5	3⅓%	Hastings & St. L. 3½ p.c.	87—89	48—53	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c..	..	115—125*	..
121,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97	..
65,780	"	"	6⅔	5⅔%	Do. B	115—118	72—77	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	63—66	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	87—89	87½—88½
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	66—66½
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87	83½—84
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	82—84	..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅜—3⅞	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	89—100	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8
1,875,892	Stk.	July 29	4½	3 1/16%	Newcastle&Gatsh'd Con.	95½—99½	75½—76½*	..
539,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	60—62	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	2—3	..
60,000	50	Feb. 26	13	10%	Portsea, Island B	125—131	82—87*	..
100,000	50	"	12	9%	Do. C	118—121	72—77*	..
52,000	50	"	10	7%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1⅜—2	35/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2½—3	55/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—78	..
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	57—63	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
125,000	50	July 1	5	5%	San Paulo { 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	"	"	10	10%	Do. B	222—224	178—181	..
523,500	"	"	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African.	10½—11½	9—10	..
6,609,895	Stk.	Feb. 10	5/4/0	40/-	South Met. 4 p.c. Ord.	111—113	69—71	69—70½
—	—	—	—	—	Do. Pref.	..	93—95	94
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	54—56	55½—56
224,820	"	Feb. 26	8½	6%	South Shields Con. Stk.	157—160	134—136*	..
962,795	"	"	6	4½%	S'th Suburb'n Ord. 5 p.c.	114—116	73—75*	73½
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	73—75*	..
135,000	—	—	—	4½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	84—86	..
647,740	"	May 14	5	5%	Southampton Ord.	99—102	75—77	..
120,000	"	Feb. 12	7½	5½%	Tottenham District { A 5 p.c.	135—138	90—95*	..
782,275	"	"	6	4%	Tottenham District { B 3½ p.c.	115—117	68—70*	..
181,255	"	June 26	4	4%	Tottenham District { 4 p.c. Deb.	87—89	61—63	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	90—91	..
80,000	"	Feb. 26	8⅜	67/6	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c..	151—156	108—113*	..
255,636	"	"	6⅞	52/6	Do. B 3½ p.c.	129—134	90—95*	..
108,075	"	"	5/17/8	47/3	Do. C 3½ p.c.	110—115	82—87*	..
352,000	"	"	6⅛	46/3	Wimbledon 5 p.c.	117—122	82—87*	..
98,000	"	"	6⅜	52/6	Epsom 5 p.c.	121—126	91—96*	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	49—52	..

* Ex Div.

New Joint-Stock Companies.—A private Company, with the title of the Low-Temperature Construction Company, and having a capital of £100 in £1 shares, has been registered, as engineers, owners of works for procuring, refining, &c., coal tar, pitch, sulphates, gases, &c.—Another private Company, with a similar capital, is Allied Bye-Products and Chemical Industries, to carry on business as manufacturing chemists.—The E. W. Harvey Gas-Furnace Company, has a capital of £8000 in £1 shares. The proprietors are the managers and staff of the Siemens regenerative gas-furnace business carried on at Queen Anne's Gate, Westminster, in the name of "Frederick Siemens, successor to Sir William Siemens." The business was originally established in London by Sir William Siemens in 1856 with a British staff; and the new company, through its Managing-Director (Mr. Ernest Wm. Harvey), having acquired the goodwill and assets of Frederick Siemens, is therefore now to be regarded as an all-British concern.

An explosion of escaped gas last week wrecked two shops in Quarry Bank, South Staffordshire, and caused severe personal injury to two men. One of them took a lighted candle to the place where the meter was, to light him to find the tap.

The Industrial Reconstruction Council are holding a meeting at the Town Hall, Manchester, to-morrow (Wednesday), under the auspices of the Lord Mayor. Mr. G. H. Roberts (Minister of Labour) and Sir William M'Cormick (of the Department of Scientific and Industrial Research) will be the leading speakers. This is the first of a series of public towns' meetings in all the great industrial centres of the country, arranged by the Industrial Reconstruction Council with the object of awakening national interest in the vital industrial problems of the immediate future.

The London County Council have approved a supplemental estimate of expenditure on maintenance account of £2900, in respect of gas and electricity. The Education Committee pointed out that the price of gas and electricity had advanced by 18 p.ct. since October last, when the figure of £32,730 in the school maintenance vote for 1917-18 was prepared.

The net profits of the Richmond Gas Stove and Meter Company for the past year were £37,151, after providing for debenture interest; and £6073 was brought forward. A final dividend of 5 p.ct. and a bonus of 5 p.ct. are proposed on the ordinary shares, making 15 p.ct., free of income-tax, for the twelve months; writing £7666 off plant, adding £5000 to the reserve (making that fund £70,000), and carrying forward £10,607, subject to Directors' fees. The Directors recommend that £100,000 of the reserve and contingent funds be capitalized, and that one new ordinary share be allotted for every similar share now held. Authority to increase the share capital to £460,000 is sought.

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

MANAGER. Ayr Gas Company. Applications by March 31.
CHEMIST. No. 6422.
WATER WORKS SUPERINTENDENT. Calcutta Corporation. Applications by May 1.
WORKING MANAGER. Somerton Gas-Works.
FOREMAN (SULPHATE, &c., PLANT). No. 6423.
SHIFT FOREMEN (TWO). Winchester Water and Gas Company.
GENERAL FITTER. Leek Gas-Works.

Appointments, &c., Wanted.

OFFICE WORK OR TRAVELLING (Fire-Clay Trade). No. 6419.
MANAGER OF MANAGER AND SECRETARY. No. 6389.

Plant, &c. (Second-Hand) Wanted.

GALVANIZED STEEL BARRELS. Munster Simms & Co., Belfast.

Plant, &c. (Second-Hand) for Sale.

GASHOLDERS, WASHER SCRUBBERS, PUMPS, &c. Stafford Gas-Works.
MOUTHPIECES, ASCENSION PIPES, &c. No. 6420.

Meeting.

BRITISH GAS LIGHT COMPANY. No. 11, George Yard, Lombard Street, E.C. March 27. Twelve o'clock.

TENDERS FOR

Oxide Conveyors, Elevator, and Grids.

BURTON TOWN COUNCIL. Tenders by March 25.

Exhausting Plant.

BURTON TOWN COUNCIL. Tenders by March 25.

Condenser, Washers, and Scrubbers.

BURTON TOWN COUNCIL. Tenders by March 25.

General Stores (Brass and Copper Tubes and Fittings, Lead Pipe, Iron, Retort Bolts, &c., Buckets, Shovels and Forks, Sulphuric Acid, &c.),

WIGAN GAS DEPARTMENT. Tenders by March 18.

Pipes, &c.

WIGAN GAS DEPARTMENT. Tenders by March 18.

Tar and Liquor.

ROTHWELL GAS LIGHT COMPANY. Tenders by March 20.
WIGAN GAS DEPARTMENT. Tenders by March 18.

Turntable.

BURTON TOWN COUNCIL. Tenders by March 25.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

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Resists 4,500° Fahr. Best for Gas-Works.
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BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.

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SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement. Feb. 19, p. 371

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

WORKS Manager of a Gas Company, (Output 60 Million c.ft.), with Charge of Distribution, REQUIRES SIMILAR POSITION, or one as MANAGER and SECRETARY. Age 42. Seventeen Years' Experience. Good Business Abilities, Engineering Knowledge, and Excellent References.
Address No. 6389, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

GENTLEMAN, Experienced in Fire-Clay Retort and Brick Trade, is open to an Engagement—OFFICE WORK or TRAVELLING, or the Two Combined. Could introduce Business with Gas Companies.
Address No. 6419, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

AYR GAS COMPANY, LIMITED.

THE Directors of the Ayr Gas Company, Limited (Vertical Retorts), invite Applications for the Position of MANAGER at their Works.
The Emoluments offered are £300 per Annum to commence, with free House, Coal, Gas, Water, and Taxes; and the successful Candidate will require to Devote his Whole Time to the Duties of the Company.
Each Applicant to send Nine *Copies* of his Testimonials, and Canvassing of Directors will disqualify.
Applications to be addressed to Mr. James Wilson, Secretary, National Bank of Scotland, Limited, Ayr, on or before March 31, 1918.

WANTED—a Working Manager, for Small Gas-Works at Somerton, Somerset. About 4 Millions Output. Good Mechanic desired. Wages, 35s. to start, with House, Fuel, and Light.
Apply to J. S. Taylor, Secretary, Somerton, Somerset.
March 5, 1918.

WANTED—Chemist to Examine Oils and Other Colliery Stores.
Apply, by letter, stating Age, Qualifications, and Salary required, to No. 6412, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WANTED—a Foreman to Take Charge of small Sulphate of Ammonia, Tar Dehydration, and Benzol Plants at a Gas-Works near London.
Apply, by letter, stating Experience, present Position, Age, and Wages Required, to No. 6422, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WANTED, by the Winchester Water and Gas Company for their Gas-Works, Two SHIFT FOREMEN (Ineligible) to Take Charge under Works Superintendent Night and Day alternately.
Apply, giving full Particulars, to the General Manager, 19, Staple Garden, Winchester.

WANTED—A Handy Gas-Works GENERAL FITTER, able to do Blacksmith's Work. Hours, 55½ per Week. Week's holiday, with Pay, per annum given.
Apply, stating Age, Experience, and Wages required, to the undersigned.
Comfortable and Permanent Job to a Good Man.
Rd. H. Gimman,
Engineer and Manager.
Gas-Works,
Leek.

CORPORATION OF CALCUTTA.

WATER-WORKS SUPERINTENDENT.

APPLICATIONS are invited for the Post of SUPERINTENDENT in the Water-Works Department of the Corporation of Calcutta, on a Salary of Rs. 400, rising by annual increments of Rs. 20 to Rs. 500 per Month, with a fixed Conveyance allowance of Rs. 50 per Month.
Applicants must possess a Good All-Round Experience of some large Water-Works, and should be well up in Waste Prevention and Pipe-Laying. They should also have a good knowledge of Plumbing and some knowledge of Building Work.
In the case of a Candidate selected in the United Kingdom, Second Class Passage from London to Calcutta, with half pay on the Voyage, will also be paid; but he will have to submit to a Medical Examination in London.
The person appointed will be subject to the Leave and other Rules in force in the Corporation, and will be required to subscribe to the Provident Fund.
Applications, stating Age and Qualifications, and giving full Particulars of Experience, together with *copies* of Testimonials and accompanied by a Medical Certificate of recent date, showing that the Candidates are of Sound Constitution and in Good Health, and addressed to the Secretary, Municipal Office, Calcutta, will be received up to the 1st of May, 1918, or up to the date of the receipt in Calcutta of letters posted in the United Kingdom on or before the 15th of March, 1918.
C. C. Chatterjee,
Secretary, Corporation of Calcutta.
5, Corporation Street,
Calcutta, Jan. 11, 1918.

GALVANIZED Steel Barrels Wanted. State Capacity, Age, Condition, and Maker, with Lowest Cash Price or Monthly Hire Charge, to Munster Simms & Co., Ltd., Belfast.

FOR SALE—One Rope-Guided Two-Lift GASHOLDER, about 170,000 c.ft. capacity. Outer Lift, 80 ft. by 20 ft.; Inner Lift, 78 ft. by 19 ft.
One Single-Lift Column-Guided GASHOLDER, about 20,000 c. ft. capacity.
One Three-Quarter Million c.ft. Walker WASHER and SCRUBBER MACHINE.
One Cast-Iron TOWER SCRUBBER, 33 ft. 6 in. High, 8 ft. Diameter.
One Steel TOWER SCRUBBER, 31 ft. 6 in. High, 7 ft. Diameter.
Three Lee Howl Direct-Acting LIQUOR PUMPS. Size, 3 in. Diameter Steam Cylinder × 3 in. Diameter Plunger × 9 in. Stroke.
The above may be Inspected at the Gas-Works, Stafford, any day, or further Particulars obtained from the Engineer and Manager, Gas-Works, Stafford.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Co., Ltd., Church Fenton, near Leeds.

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FOR Disposal, a Large Quantity of 22 × 16 Self-Sealing MOUTHPIECES, SIDE BENDS, ASCENSION PIPES, BRIDGE, and DIP PIPES in Excellent Condition.
Full Particulars on applying to No. 6420, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

COUNTY BOROUGH OF WIGAN.

(Gas Department.)

THE Gas Committee invite Tenders for the Supply of STORES over the Year ending on March 31, 1919, as follows:—

(a) WROUGHT-IRON TUBES and FITTINGS.
(b) BRASS and COPPER TUBES and FITTINGS.
(c) LEAD GAS-PIPE.
(d) MERCHANT IRON.
(e) WEED BROOMS.
(f) SHOVELS and COKE FORKS.
(g) WOOD TROUGHING and COVERING.
(h) GALVANIZED STOVE PIPE and CONNECTIONS.
(i) CAST MAINS and CONNECTIONS.
(j) SCREWS and RETORT BOLTS.
(k) GALVANIZED BUCKETS.
(l) SULPHURIC ACID.

And for the Purchasing of Surplus TAR.
The Committee do not bind themselves to the acceptance of any Tender.
Particulars and Forms of Tender may be obtained on Application to Mr. F. Betley, Gas Engineer, Gas-Works, Wigan.
Tenders, Sealed and Endorsed "Tenders for Stores," to be Delivered to me on or before March 18 next.
William Henry Tyrer,
Town Clerk.
March 5, 1918,

BOROUGH OF BURTON-UPON-TRENT.

GAS-WORKS EXTENSIONS.

THE Gas and Electricity Committee of the Burton-upon-Trent Town Council invite TENDERS for the following CONTRACTS in connection with the above:—

OXIDE CONVEYORS AND ELEVATOR,
PURIFIER HURDLE GRIDS,
RAILWAY TURNTABLE,
EXHAUSTING PLANT,
CONDENSER,
WASHERS and SCRUBBERS.

Conditions, Specifications, and prints of Drawings will be supplied to suitable Contractors on written Application to the Manager, Gas-Works, Burton-upon-Trent.
No Tender will be accepted from any party who pays his employees (whether Artisans or Labourers) less than the Standard Rate of Wages paid in this Borough, or who does not conform to the Hours and Conditions of Labour generally recognized in each branch of the industry affected; and Clauses to ensure Payment of the Standard Rate of Wages, &c., for work done under the proposed Contract will be inserted in the Contract.
Sealed Tenders, endorsed with the name of the Contract, addressed to the Chairman of the Gas and Electricity Committee, must be Delivered to the undersigned on or before 10 a.m. on Monday, 25th March.
The Committee do not bind themselves to accept the lowest or any Tender.
John B. Chapman,
Town Clerk.
Town Hall, Burton-upon-Trent,
March 4, 1918.

ROTHWELL GAS LIGHT COMPANY.

THE Directors of the above Company invite TENDERS for their Make of LIQUOR (approximately 550 Tons) over Twelve Months ending March 31, 1919.
The Company to Deliver into Buyers' Tanks f.o.r. Rothwell Station (East and West Yorkshire Union Railways).
Tenders to state Price per Ton as Tested by No. 1 Twaddel Hydrometer.
Sealed Tenders, endorsed "Liquor," to be sent to the Chairman, Gas Offices, Rothwell, on or before March 20, 1918.
Arthur Wormald,
Secretary.
Gas Offices, Rothwell, nr. Leeds,
March 8, 1918.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Chief Office of the Company, No. 11, George Yard, Lombard Street, in the City of London, on Wednesday, the 27th day of March, at Twelve o'clock precisely, to Transact the usual Business; and to declare a Dividend for the Half Year ended the 31st of December last.
Notice is Hereby also Given that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 16th inst., and RE-OPENED on the 28th inst.
By order of the Court of Directors,
A. W. Brookes,
Secretary.
Chief Office: No. 11, George Yard,
Lombard Street, London, E.C. 3,
March 8, 1918.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 37, Walbrook, E.C.

8vo., *Cloth Bound, Gilt Lettered.* Price 6/-, *Post Free in the United Kingdom.*

The "Powers of Charge" of the **METROPOLITAN GAS COMPANIES.**
A History of the Question of Price in London, from the Introduction of Gas Lighting.
By the late LAURENCE W. S. ROSTRON, M.A., B.C.L.
LONDON:
WALTER KING, "Gas Journal," 11, Bolt Court, Fleet Street, E.C. 4.

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also
THE MAXIM PATENT CARBURETTOR.
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SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 6451, 6452, 6453, and 6454 London Wall.
Telegraphic Address: "Carburine, London."